OGDEN VALLEY TOWNSHIP PLANNING COMMISSION

PLANNING MEETING AGENDA

August 26, 2014
5:00 p.m.

Pledge of Allegiance
Roll Call:

1. Minutes: Approval of the July 22, 2014 and August 5, 2014 meeting minutes

2. Consent Agenda:

2.1. CUP 2014-19 **Consideration and action on a Conditional Use Permit (CUP) for the removal and replacement of the existing Sundown Ski Lift located at Powder Mountain Ski Resort in the Forest-40 (F-40) Zone (Summit Mountain Holding Group) SMHG**

3. Petitions, Applications and Public Hearings

3.1. Administrative Items

a. Old Business

1. CUP 2014-14 **Consideration and action on a Conditional Use Permit (CUP) application for a dog kennel at approximately 5784 E 2300 N in the Agricultural Valley-3 (AV-3) Zone (Stacey Bowman, Applicant)**

4. Public Comment for Items not on the Agenda

5. Remarks from Planning Commissioners

6. Report of the Planning Director

7. Remarks from Legal Counsel

8. Adjourn to a Work Session

WS1. Cluster Subdivision Bonus Density Discussion

The meeting will be held in the Weber County Commission Chambers, Weber Center, 2380 Washington Blvd., Ogden UT
A pre-meeting will be held at 4:30 P.M. in Room 108, no decisions will be made in this meeting.

(In compliance with the Americans with Disabilities Act, persons needing auxiliary services for these meetings should call the Weber County Planning Commission 24 hours in advance of the meeting at 801-399-8791)

Minutes of the Ogden Valley Planning Commission Regular meeting July 22, 2014, in the Weber County Commission Chambers, commencing at 5:00 p.m.

Present: Pen Hollist, Chair; Ann Miller; John Howell; Kevin Parson; Greg Graves; Laura Warburton
Absent/Excused: Will Haymond
Staff Present: Sean Wilkinson, Planning Director; Jim Gentry, Principal Planner; Scott Mendoza, Principal Planner; Charlie Ewert, Principal Planner; Ben Hatfield, Planner; Chris Allred, Legal Counsel;Kary Serrano, Secretary
Guests: Jennifer Graham; Eric Langvardt; Paul Strange; Jeff Werbelow; Ray Bertoldi; Rick Everson

Pledge of Allegiance
Roll Call:

1. **Minutes:** Approval of the June 24, 2014 meeting minutes

MOTION: Chair Hollist approved the meeting minutes as written.

Chair Hollist asked if any member had ex parte communications they would like to declare. No ex parte communications were declared.

2. Petitions, Applications and Public Hearings
2.1. Administrative Items
a. New Business
1. CUP 2014-16: Consideration and action on a Conditional Use Permit (CUP) application for a dog kennel at approximately 5784 E 2300 N in the Agricultural Valley-3 (AV-3) Zone (Stacey Bowman, Applicant)

Jim Gentry said the applicant is requesting approval of a conditional use for a pet vacation station (dog kennel) on a 3 acre lot in the Agricultural Valley (AV-3) zone which allows dog breeding dog kennels, or dog training schools with the following requirements: The number of dogs cannot exceed 10 dogs of more than 10 weeks old, per acre, at any time. The buildings or enclosures for the animals shall be located not less than 100 feet from a public street and not less than 50 feet from any rear or side property line. The lot has 244 feet of frontage with the proposed structure being at least 100 feet from 2300 North. The building common area and outdoor kennel will be located in the middle of the property. The lot also has an existing house with an outbuilding. The kennel will be located more than 40 feet from the house. The applicant is proposing a 30 ft. x 50 ft. air conditioned building for the dogs. A dog run to the east of the building with pea gravel, a fenced common area will be grassed to the north of the building. The applicant is considering placing signs at the entrance of the asphalt drive to identify the entrance points to the dog day care. The hours of operation will be 8:00 AM to 6:00 PM daily. The proposal is to have between 2 and 20 dogs.

The proposed use complies with applicable County Ordinances and the Ogden Valley General Plan. Staff recommends approval of CUP 2014-16 for a dog kennel in the AV-3 Zone, subject to staff and other review agency requirements. This recommendation is based on the proposed kennel complying with applicable County Ordinances as listed previously in the staff report.

Stacey Bowman, applicant, said this is an opportunity for her to be a service provider where people can have a safe place to take their pets while they go on vacation.

Mike Gillespie, 2300 N 5688 E, suggested denial of this conditional use because the existing use of this immediate area is largely residential and an expectation of the neighbor does not include a business for profit especially one of this nature. This conditional use would adversely impact the quality of life of the current zoning and the current predominant use that it ensures. He did not receive a notice due to the 500 foot policy and requested that this policy be changed.

Marcie Butterfield, property owner adjacent to this property, said she concurred with Mr. Gillespie, and having a dog kennel in this area would be detrimental to the land value for any future use in developing this property. It was their understanding in talking to the neighbors that this area had restrictive covenants.

Commissioner Warburton said that they have no control in enforcing CC&R's. Small businesses are allowed in the AV-3 Zone with certain restrictions and they could mitigate the negative affects with a conditional use permit.

Chair Hollist asked Legal Counsel that in the event of conflict between the CC&R's and the Weber County Ordinances, would the Weber County Ordinance prevail. Chris Allred replied that they would still analyze the application under the Weber County Ordinance; however, if there are CC&R's that preclude, they can be enforced by the homeowner's association because they could have something in their CC&R's that is more restrictive than what the code permits.

Chair Hollist asked Mr. Gentry if this was a permitted use in the AV-3 Zone. Jim Gentry replied this is a conditional use and that's why there are conditions for mitigation required.

Kirk Langford, 2300 N 6200 E, said that in AV-3 Zone most people hadn't realized that a commercial dog kennel could be in this area because it is mainly used as residential. He spoke of his concern for noise and its impact on the wildlife in the area. He suggested tabling this request until they obtain information of the thickness of the walls of the building, the sound barriers, and a detailed site plan.

Shane Phelps, who resides across the street from this property, said his concern is the resale value of his property and he is nervous at the aspect of having a dog kennel next to his property. He did some research in the surrounding area of dog care facilities, and found that most of these were in areas away from residential homes. This application is a great for a more of a commercial typesetting, near railroad tracks, where the dogs can bark all night long.

Commissioner Howell clarified to Mr. Phelps that this is a conditional use where certain conditions must be met, and there are mitigating circumstances where this conditional use can be cancelled if the conditions are now followed.

Stacey Bowman said her intentions were not to upset the neighborhood. Prior to buying her property, she did research looking for lots that were out of the way from most areas. Her intentions was not having daily traffic with the daily pick up and drop off, but strictly for the people that want to take a week's vacation, bring their pet in and several days later pick up their pets. The building being built will blend in with her house; it will be fenced and protected, with a sound proofed building, to minimize the negative effects. She does not believe that it would reduce the value of the surrounding property.

Chair Pen asked if the asphalt driveway, the two stalls, the private kennels, the dog daycare center, and the common area, do they exist now in any form; and could you describe the heating and cooling insulation in the 30 x 50 building. Stacey Bowman replied no and that this building isn't even built but it would be built to specification or code to mitigate sound.

Chair Hollist explained that it states in the application that if the dog became uneasy and started barking, it would be moved inside the building. Would the building accommodate 20 dogs? Ms. Bowman replied absolutely and she would minimize any scares or concerns.

Jim Gentry responded to Commissioner Parson that the applicant is mitigating the surface things by moving the dogs indoor, their setbacks are within zoning based on the site plan, and the applicant has explained how she plans to mitigate the waste, the noise, and smells.

MOTION: Commissioner Howell made motion to approve CUP 2014-16 subject to staff and all county agency recommendations. Commissioner Graves seconded.

DISCUSSION: Commissioner Warburton suggested putting a time limit from six months to a year on the permit. Chair Hollist said that Planning Staff has an enforcement officer whose complaints are investigated, documented, and if necessary are brought to the Planning Commission. Jim Gentry said if there are complaints the permit can be revoked. Vice Chair Miller suggested being able to looking at the building to see if the applicant had it sound proofed. Commissioner Warburton said that 20 dogs may be too many and they should discuss the numbers allowed. Commissioner Graves said when it comes to sound proofing, there are not any specifications; but it could be included as a condition in the motion.

Director Wilkinson stated that any concerns they may have, the applicant could come back with some sort of documentation that their concerns have been mitigated. Commissioner Howell said from personal experience, his neighbor put his barking dog in the garage, and they could not hear the dog barking. Commissioner Parson said he would like to see a true scale drawing, showing some land berms at least 60 feet from the kennel area. Commissioner Graves said it would be helpful that the site plan be more to scale so they have better idea and as far as recommendations and they can recommend sound proofing the building. They can request to see the plans before the building is constructed; and this is a conditional use so if it doesn't meet the approved requirements, it can be revoked. Chair Hollist said called for a vote.

VOTE: A vote was taken with Commissioner Howell voting aye and Commissioner Miller, Parson, Warburton, and Chair Hollist voting nay. The motion failed by a 5-1 vote.

MOTION: Commissioner Parson moved to approve the application for a dog kennel CUP 2014-16 with the restrictions of reviewing the engineering site plan for the building, reviewing landscape berming, and that the permit is to be reviewed within one year from being built.

Director Wilkinson said in regard to the suggestion of landscape berming there is a landscape requirement that has to be met. Unless landscape berming is specifically designed to mitigate a detrimental effect of noise, odor, or something else, he didn't know if this could supersede the requirement that is already in place in the land use code.

SUBSTITUTE: Commissioner Parson moved to table the application for a dog kennel CUP 2014-16 until a site plan, a building plan, is submitted. The motion is subject to a recommendation that this comes back again for a year review. Commissioner Miller seconded.

DISCUSSION: Commissioner Howell clarified the motion stated one year for a review, but the applicant can bring this back sooner. Commissioner Miller said they would look at the sound mitigation one year after it's built. Commissioner Howell said the applicant could bring in the site plan and building plan, so they can review, and then they could make a motion to approve it then. Chair Hollist said for clarification, the motion would be that this action is tabled until the plans and mitigating factors are all documented and presented to them, and then they would act on the plan. Then a year after it is built the applicant would come in to show the plan is actually working. Commissioner Parson said he shouldn't have included that and that would be for the next meeting as part of the motion.

AMENDED MOTION: Commissioner Parson moved to table the application for a dog kennel CUP 2014-16 so the applicant can bring in a site plan and a building plan. Commissioner Miller seconded.

FRIENDLY AMENDMENT: Commissioner Warburton suggested including some professional opinion of what 20 dogs would do in a kennel, what kind of space they need, how that would impact on the environment around them, so this commission can see how many animals they would want in that kennel. Commissioner Parson agreed.

VOTE: A vote was taken with all members' present voting aye and Chair Hollist indicated that the motion carried (6-0)

2. CUP 2014-14: Consideration and action on a Conditional Use Permit (CUP) application to amend an existing site plan on a cellular wireless facility located at 3925 Snowbasin Road in the Ogden Valley Destination Recreation Resort (DRR-1) Zone (Verizon, Applicant; Pete Simmons, Agent)

Ben Hatfield said the applicant is requesting approval of a conditional use to amend an existing site plan on a cellular wireless facility (public utility substation) near the east parking lot of the Snowbasin Ski Resort located at approximately 3925 Snowbasin Road. The DRR-1 Zone allows a "public utility substation" as a conditional use. A 67 foot monopine cell tower has been proposed that will have features added to resemble a pine tree. At the top of the tower, the array will have 8 ft. tall panels at four per sector (12 total) which will also be covered to assemble a tree. The site will have a 12 ft. x 25 ft. pre-fabricated equipment shelter that is covered in small rock. A fence will surround the 22 ft x 48 ft leased area. The fence is to be 6 feet tall with a matching gate made of wood composite in a board-on-board style in a rustic cedar color.

As a conditional use, this operation is allowed in the DRR-1 Zone. With the establishment of appropriate conditions as determined by the Planning Commission, this operation will not negatively impact any of the goals and policies of the General Plan. Staff recommends approval of this conditional use application subject to the applicant meeting the requirements in the staff report and any other conditions and requirements by Planning, Engineering, and Building Inspection.

Pete Simmons, Verizon Applicant, said in regards to the lighting question, typically the FAA requires that anything above 199 feet they have to light. The actual pole is going to be at 62 feet and the branches go above that so it looks somewhat like a tree. Snowbasin has been working on a proposal to upgrade the whole resort. They have an existing facility further to the east that kind of feeds this and Verizon is proposing a 62 foot monopine, with an overall height of 67 feet, and a 12 x 27 equipment shelter. It's going to be within a fenced area of 22 x 40, with a track and deck board-on-board that mimics a wood fence. This pole is located almost up against the knoll amongst the trees where they have a lot of aspens and pine trees sporadic throughout that hillside. In talking with Snowbasin, they wanted something that would blend in, and the monopole was the best choice. Snowbasin is working with them on another facility to help out because this facility will help the day lodge and get portions of the lower part of the resort.

Chair Hollist asked what is meant by board-on-board. Pete Simmons replied if you think of a 6 foot wood fence, it is basically board on top of board.

Chair Hollist asked what provisions have you made for co-location by other vendors on that tower and equipment building. Pete Simmons replied that Verizon is standard size equipment building is 12 ft. x 26 ft. and they don't allow anyone within their facilities because they are secure and there isn't enough space. Three quarters of that space is for all of their radio equipment and the other quarter is for their backup generators. Due to the homeland security regulations for their network, they are required to put generators in all of their inside facilities.

Gary Fullmer, who resides in Eden, said he would like to recommend approval of this conditional use permit but believes any exterior lights or any future exterior lights should be dark sky compliant.

Rich Webb, 3846 North River Drive, said working as a ski patrolman in Snowbasin, his concerns are routinely landing their helicopters in that area as they have an avalanche beacon training center and the tower could cause interference for avalanche beacons. He asked if there have been any studies done on that? Chair Hollist replied he believes it complies with the FAA regulations.

Pete Simmons replied that if they were to interfere with anything up in Snowbasin, once the site is up and they are notified of any interference, LEED regulations require that they have to mitigate that between Verizon and Snowbasin. The plans go through an environmental review with the FAA and they dictate what they want as part of their standard procedures.

MOTION: Commissioner Miller made a motion to approve CUP 2014-14 for Verizon to amend the existing site plan on the Verizon cellular wireless facility. Commissioner Howell seconded.

VOTE: A vote was taken with all members' present voting aye and Chair Hollist indicated that the motion carried (6-0)

3. **Presentation: Ogden Valley Maximum Zoning Density Study**

Charles Ewert went through the information provided in his presentation, a copy of his presentation which is on file in the Planning Division Office. The General Plan is a basic guiding document from which a community is built and some of the regulations to govern development through some kind of planning effort. It's the tool that planners use to make good decisions, when making a law they go back to the General Plan; to say does this meets the vision, the goals, the objectives and the policy recommendations of the General Plan. The study's main points included:

- **What is a General Plan?**
- **Why Plan?**
- **Ogden Valley Zoning Density Study**
- **Ogden Valley Maximum Zoning Density Study**
- **How did we get here?**

- **Ogden Valley General Plan Update: What to Expect**
- **Get Involved:**
  1. This will be a big project. All members of the community are encouraged to get involved and stay informed.
  2. This slide show and the Ogden Valley Maximum Zoning Density Study can be obtained at: http://www.co.weber.ut.us/mediawiki/index.php/Planning
  3. Density Calculator will be available at the same location soon
  4. Send Comments and questions to: Charlie Ewert – 801-399-8763 – cewert@co.weber.ut.us

Steven Clark, who resides in Huntsville,

4. Presentation: Powder Mountain Master Plan

Scott Mendoza said that Powder Mountain representatives are here tonight and what this Planning Commission will be considering soon will be a destination resort. Powder Mountain is requesting you consider sometime in the near future amending the zoning map and create what is called the Destination Recreation Resort-1 (DRR-1) Zone. This is a 366 acre project consisting of about 2,800 units, spread across and built within six different development areas. Staff has sent this application to several review agencies and several potential groups/individuals.

Eric Vanguard introduced Paul Strange, COO Summit; Jeff Werbelow, Development Coordinator; Ray Bertoldi, Architect; and Rick Everson, Civil Engineering

Eric Vanguard went through the information provided in his presentation, a copy of which is on file in the Planning Division Office. Their submittal contained the following components:

1. **Master Plan**
2. **Overall Land Use Plan**
3. **Overall Master Plan**
4. **Mid-Mountain Master Plan**
5. **The Ridge Master Plan**
6. **Earl's Village Master Plan**
7. **Summit Powder Mountain Village Master Plan**
8. **Gertsen Master Plan**
9. **The Meadow Master Plan**
10. **Recreation Plan**
11. **Open Space with Trails Plan**
12. **Seasonal Workforce Housing Plan**

5. Presentation: North Fork Park Master Plan – Jennifer Graham

Jennifer Graham went through the information provided in her presentation, a copy of which is in file in the Planning Division Office. The Master Plan included the following components:

1. **Mission Statement**
2. **Operational Philosophies**
3. **Current Inventory**
4. **Projects in Motion**
5. **Water Shed Concerns**
6. **Utah Foundation's 2008 Research Brief on Population Grown**
7. **Summer Trails**
8. **Winter Trails**
9. **Current Contractor Arrangements – Ogden Nordic – Nordic Center**
10. **Other – Day Use Areas**
11. **Other – Ordinances and Rules**
12. **Other – Miscellaneous**
13. **Aspen Introduction Plan**
14. **Conclusion**
15. **Recommendations - Water Shed/Supply**
16. **Recommendations (con't) – Summer Trails**
17. **Recommendations (con't) – Winter Trails**
18. **Recommendations (con't) – Other Recommendations**

Steven Clark said that he would provide the data to the Planning Commission in reference to the Climate Change and Utah. Chair Hollist replied that he would happy to receive the information.

10. **Adjourn:** The meeting was adjourned at 8:55 p.m.

Respectfully Submitted,

Kary Serrano

Kary Serrano, Secretary,

Minutes of the Ogden Valley Planning Commission Regular meeting August 5, 2014, held in the Weber County Commission Chambers, commencing at 5:00 p.m.

Present: Ann Miller, Vice Chair; John Howell, Kevin Parson, Laura Warburton, Will Haymond
Absent/Excused: Pen Hollist, Chair; Greg Graves,
Staff Present: Sean Wilkinson, Planning Director; Jim Gentry, Principal Planner; Scott Mendoza, Principal Planner; Charles Ewert Principal Planner, Ben Hatfield, Planner; Chris Allred, Legal Counsel; Kary Serrano, Secretary

Pledge of Allegiance
Roll Call:

Vice Chair Miller asked if any member had ex parte communications they would like to declare. No ex parte communications were declared

1. Consent Agenda:

1.1. CUP 2014-17: Consideration and action on a conditional use permit application for a public utility substation (water storage tank) for Weber County Memorial Park located at approximately 14375 East Canyon Drive within the Forest-5 (F-5) Zone. (Jennifer Graham Weber County Parks Director, Applicant)

MOTION: Commissioner Howell moved to approve consent agenda item CUP 2014-17. Commissioner Parson seconded.

VOTE: A vote was taken and Vice Chair Miller indicated that the motion carried 5-0.

3. Planning Director's Report

Sean Wilkinson said the upcoming Utah APA Fall Conference will be in October at the Planetarium at the Gateway in Salt Lake City. This year the APA Conference will be combined with the Western Planner Conference; with planners from most of the western states attending this conference with us. It will be held for three days this year because it is a larger conference. He asked who was interested in going and Commissioner's Parson, Howell, and Haymond said they would be interested in attending.

2. Adjourn to a Work Session:

Charlie Ewert said that in a recent staff meeting, he and Sean Wilkinson had discussed a need for some training. They are happy to bring in Brent Bateman, State Ombudsman, to talk about Administrative Decision Making. Mr. Ewert previously emphasized the Ogden Valley full build out situation in a presentation and thought they could use a little more background on the difference between legislative/administrative decision making, conditional use permits, land use permits in general, etc.

WS1. Training: Administrative Decision Making and Land Use Authorities
(Brent Bateman, State of Utah Property Rights Ombudsman)

Brent Bateman went through the information provided in the presentation, a copy of which will be on file in the Planning Division Office.

OUTLINE: MAKING LAND USE DECISIONS

- **Land Use Decisions**
- **Land Use Decisions – Different Roles**
- **Planning Commissioner's Role:**
- **Land Use Decisions – The Law of Property Rights**

- **What are Property Rights?**
- **Land Use Decisions – Takings**
- **Limits on Land Use Regulation**
- **The General Rule**
- **Land Use Decisions – Decision Makers' Discretion**
- **Decision Maker's Decision**
- **Land Use Application – Land Use Decision – Arbitrary, Capricious, & Legal**
- **Legislative Decision – Administrative Decision**
- **Land Use Decisions – Conditional Uses**
- **Conditional Use**
- **Land Use Decisions – Other Land Use Decision**
- **Land Use Law – The Key Topics**
- **Related in Nature/Extent and Roughly Equivalent in Cost**
- **Fees**
- **Land Use Application – Land Use Decision – Legislative/Administrative Decisions**

WS2. Adjourn: The meeting was adjourned at 7:45 p.m.

Respectfully Submitted,

Kary Serrano

Kary Serrano, Secretary,
Weber County Planning Division

Staff Report to the Ogden Valley Planning Commission

Weber County Planning Division

Synopsis

Application Information

Application Request:	Consideration and action on the removal and replacement of the existing Sundown ski lift at Powder Mountain Ski Resort.
Agenda Date:	Tuesday, August 26, 2014
Applicant:	Summit Mountain Holding Group (SMHG)
File Number:	CUP 2014-19

Property Information

Approximate Address:	Powder Mountain Ski Resort
Project Area:	N/A
Zoning:	Forest–40 (F-40)
Existing Land Use:	Ski Resort
Proposed Land Use:	Upgrading the Sundown Ski Lift
Parcel ID:	220010026
Township, Range, Section:	T7N, R1E, Section 1

Adjacent Land Use

North:	Ski Resort	**South:**	Ski Resort
East:	Ski Resort	**West:**	Ski Resort

Staff Information

Report Presenter:	Jim Gentry jgentry@co.weber.ut.us 801-399-8767
Report Reviewer:	SW

Applicable Ordinances

- Weber County Land Use Code Tile 104 Zones Chapter 9 Forest Zones F-5, F-10, and F-40 (F-40 Zone)
- Weber County Land Use Code Title 108 Standards Chapter 4 (Conditional Use)

Type of Decision

Administrative Decisions: When the Planning Commission is acting as a land use authority, it is acting in an administrative capacity and has much less discretion. Examples of administrative applications are design reviews, flag lots, and subdivisions. Administrative applications must be approved by the Planning Commission if the application demonstrates compliance with the approval criteria.

Background

The Weber County Planning Division has received an application for a Conditional Use Permit to allow the removal and replacement of the existing Sundown ski lift at Powder Mountain Ski Resort. The ski lift lies within the Forest-40 (F-40) Zone which conditionally allows ski resorts, infrastructure, equipment, and related facilities.

The intent of the conditional use is to replace and update Sundown ski lift, and alleviate base area congestion by moving the base alignment and equipment approximately forty feet and up the hill to a spot that is 10 feet higher in elevation than the present location. The realignment will move the ski lift from the drainage area, which receives water during the spring runoff. The new towers will be about 4 feet taller because of the safety equipment that is installed at the top. Some of the new ski lift towers will have light for the night skiing that is done in this area. The ski resort is working on a new lighting plan for the night skiing. The Sundown ski lift was installed at Powder Mountain in 1971. The lift has operated for approximately 61,000 hours, and has exceeded its mechanical life expectancy. The ski lift is a safety concern. The proposed lift will provide an increase in capacity and guest experience.

Demolition of the lift has already taken place and they would like to start construction immediately in order to have the ski lift ready for operation this ski season. Minor grading and re-seeding will take place after construction of the new lift and

removal of the existing lift is complete. A financial guarantee can be given if Powder Mountain requests a Certificate of Occupancy prior to finishing the final grading and re-seeding.

Summary of Planning Commission Considerations

- Does the proposed use meet the requirements of applicable Land Use Codes?
- Are there any potentially detrimental effects that can be mitigated by imposing conditions of approval, and if so, what are the appropriate conditions?

In order for a conditional use permit to be approved it must meet the requirements listed under "Criteria for Issuance of Conditional Use Permit." The Planning Commission needs to determine if the proposed use meets these requirements.

Sec. 108-4-4 Criteria for issuance of conditional use permit:
Conditional uses shall be approved on a case-by-case basis. The Planning Commission shall not authorize a conditional use permit unless evidence is presented to establish:

1. Reasonably anticipated detrimental effects of a proposed conditional use can be substantially mitigated by the proposal or by the imposition of reasonable conditions to achieve compliance with applicable standards. Examples of potential negative impacts are odor, vibration, light, dust, smoke, or noise.

2. That the proposed use will comply with the regulations and conditions specified in the Land Use Code and other applicable agency standards for such use.

After reviewing this conditional use request staff has determined that the criteria listed above have been met in the following ways:

1. The Sundown ski lift has operated since 1971 and the new lift will not add any new detrimental effects.

2. Ski Resorts are listed in the Forest Zones as a conditional use. There are no standards listed in Forest Zones for ski resorts or ski lifts. The Ogden Valley Architectural, Landscape, and Screening Design Standards, code would not apply as no new buildings are being proposed. The existing ski lift is being replaced with modern lift equipment. The new ski lift alignment is being adjusted slightly and shortened. There will be no change in the existing parking area so the Parking and Loading Space Vehicle Traffic and Access Regulations would not apply. This is the area where night skiing takes place. Some of the new ski lift towers will have lights located on them.

Conformance to the General Plan

The proposed use complies with applicable Land Use Codes and the Ogden Valley General Plan.

Conditions of Approval

- Requirements of the Weber County Engineering Division
- Requirements of the Weber County Building Inspection Division

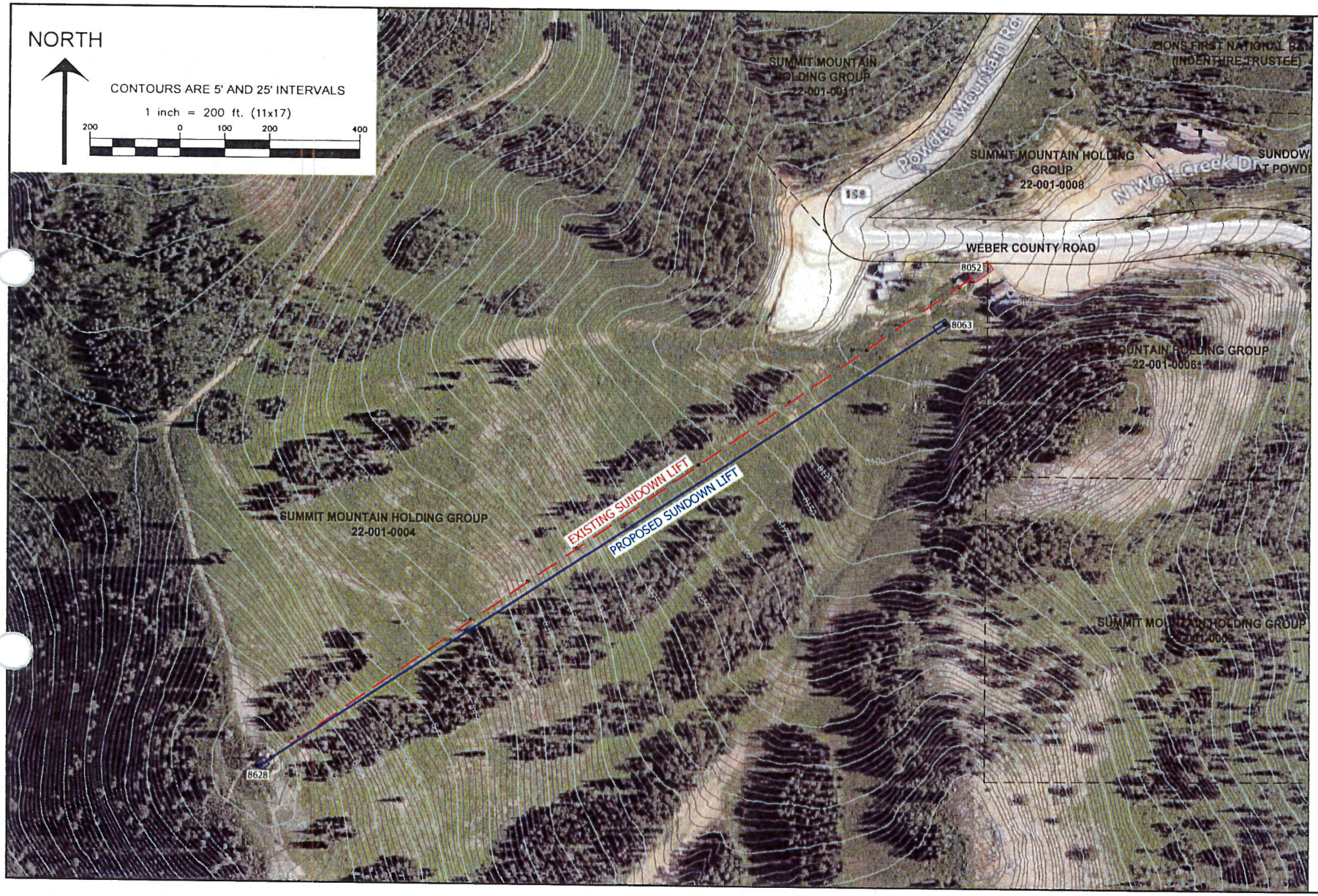
Staff Recommendation

Staff recommends approval of CUP 2014-19 for the removal and replacement of the existing Sundown ski lift at Powder Mountain Ski Resort, subject to staff and review agency requirements. This recommendation is based on the proposal complying with applicable Land Use Code standards as listed in this staff report.

The decision of the Planning Commission may be appealed to the County Commission by filing such appeal within 15 days after the written decision of the Planning Commission.

Exhibits

A. Site Plan
B. Narrative



SUNDOWN LIFT
SITE PLAN

PREPARED FOR: SUMMIT MOUNTAIN HOLDING GROUP

DATE SUBMITTED: 08/13/2014

Weber County Conditional Use Permit Application

Application submittals will be accepted by appointment only. (801) 399-8791. 2380 Washington Blvd. Suite 240, Ogden, UT 84401

Date Submitted / Completed	*Fees (Office Use)*	*Receipt Number (Office Use)*	*File Number (Office Use)*
08/13/2014	$125	3252	CUP 2014-19

Property Owner Contact Information

Name of Property Owner(s)		Mailing Address of Property Owner(s)
Summit Mountain Holding Group- Paul Strange		3632 N. Wolf Creek Drive Eden, Utah, 84310
Phone (415) 370-1100	Fax N/A	
Email Address (required) paul@summit.co		Preferred Method of Written Correspondence ☒ Email ☐ Fax ☐ Mail

Authorized Representative Contact Information

Name of Person Authorized to Represent the Property Owner(s)		Mailing Address of Authorized Person
Jeff Werbelow		3632 N. Wolf Creek Drive Eden, Utah, 84310
Phone (435) 640-7002	Fax N/A	
Email Address jwerbelow@summit.co		Preferred Method of Written Correspondence ☒ Email ☐ Fax ☐ Mail

Property Information

Project Name	Total Acreage	Current Zoning
Sundown Ski Lift	250 acres	F-40
Approximate Address Utah Highway 158 8000 North 5100 East Eden, UTah	Land Serial Number(s) 22-001-0004	
Proposed Use Ski Lift		

Project Narrative

Summit Mountain Holding Group, LLC ("SMHG") is hereby making application for a Conditional Use Permit for the removal and replacement of the existing Sundown ski lift located in the Powder Mountain Ski Resort. The installation will include new top and bottom terminals, lift towers, chairs and lines.

The original Sundown ski lift was installed at Powder Mountain Si Resort in 1971. Since it's installation, the lift has operated approximately 61,000 hours. The lift has exceeded it's mechanical life expectancy, increasing the probability of either a catastrophic failure, and/or a downtime failure and loss of business. This liability exposure will be reduced by replacing the lift by providing a much safer lift designed to current ANSI B77.1 code.

In addition, Thiokol, the original manufacturer, has been out of business since 1974, thus the design has limited support. Certain parts have become obsolete such as the sheave hubs. Thiokol changed this hub design after the second year of production, so there are only three (3) lifts ever built using this design. The tooling to make the hubs has long since been destroyed, thus the hubs are difficult to support much further into the future. Removing the Sundown lift provides some of these parts for the future support of the Timberline lift also located in the Powder Mountain Ski Resort. Critical components, such as the main gearbox, are not supported any longer. Thus a failure of the gearbox would render it difficult to get parts for and cause significant down time if parts were sourced, such as the gears.

Continuing to run a lift this old has diminishing marginal returns, since maintenance costs continue to increase on the obsolete parts and design in general. The new lift will improve the guest experience. This will in turn create greater demand and generation of tax dollars for the County.

The new lift provides an increase in capacity. Revenue generation of the lift, as a percentage of uphill capacity, over the next thirty years is maximized by a full replacement now. The lost opportunity cost is minimized vs continuing to do maintenance and modifications.

Essentially this lift is worn out. The numerous structural issues, combined with the difficulty in getting replacement parts, renders this lift uneconomical to address in a piece meal retrofitting approach. There is no market value for the used lift as a whole.

SMHG is therefore asking the Commission to approve this application allowing the removal and replacement of the Sundown lift to be operational for the 2014-2015 ski season.

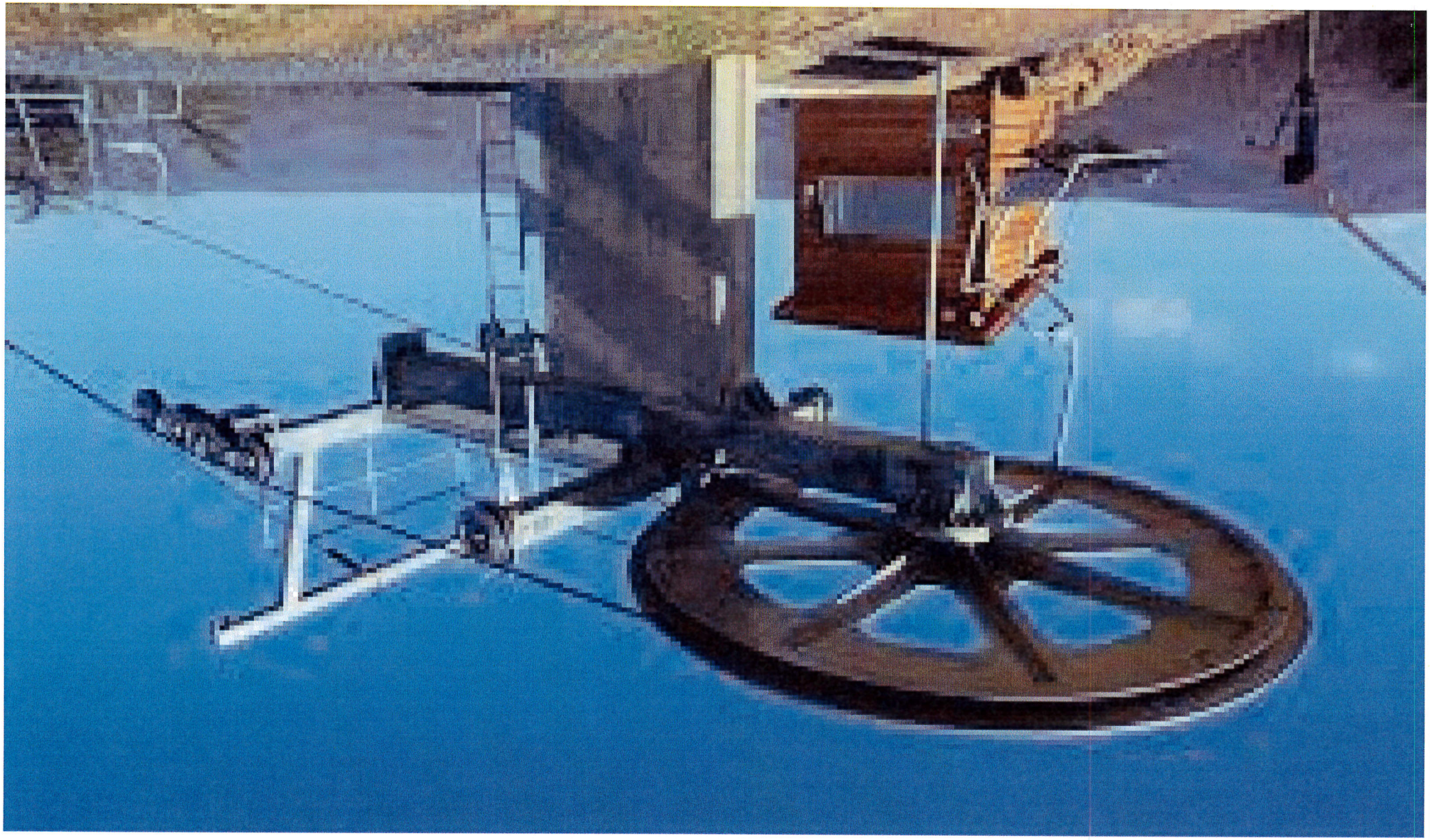
Basis for Issuance of Conditional Use Permit

Reasonably anticipated detrimental effects of a proposed conditional use can be substantially mitigated by the proposal or by the imposition of reasonable conditions to achieve compliance with applicable standards. Examples of potential negative impacts are odor, vibration, light, dust, smoke, or noise.

There are no detrimental effects foreseen with this application.

That the proposed use will comply with the regulations and conditions specified in the Zoning Ordinance and other applicable agency standards for such use.

The proposed use will comply with the regulations and conditions specified in the Zoning Ordinance and all applicable agency standards.



Staff Report to the Ogden Valley Planning Commission

Synopsis

Application Information

Application Request:	Consideration and action on a Conditional Use Permit (CUP) 2014-16 for a dog kennel in the Agricultural (AV-3) Zone.
Agenda Date:	Tuesday, August 26, 2014
Applicant:	Stacey Bowmen
File Number:	CUP 2014-16

Property Information

Approximate Address:	5784 East 2300 North
Project Area:	3 acres
Zoning:	Agricultural (AV-3) Zone
Existing Land Use:	Agricultural/Residential
Proposed Land Use:	Residential dwelling with a dog kennel
Parcel ID:	22-309-0003
Township, Range, Section:	T7N, R1E, Section 35

Adjacent Land Use

North:	Agricultural	**South:**	Agricultural
East:	Agricultural	**West:**	Agricultural

Staff Information

Report Presenter:	Jim Gentry jgentry@co.weber.ut.us 801-399-8767
Report Reviewer:	SW

Applicable Ordinances

- Weber County Land Use Code Title 104 Zones Chapter 6 Agricultural (AV-3)
- Weber County Land Use Code Title 108 Standards Chapter 4 (Conditional Uses)
- Weber County Land Use Code Title 108 Standards Chapter 7 (Supplementary and Qualifying Regulations)
- Weber County Land Use Code Title 110 Signs Chapter 2 (Ogden Valley Signs)

Type of Decision

Administrative Decisions: When the Planning Commission is acting as a land use authority, it is acting in an administrative capacity and has much less discretion. Examples of administrative applications are design reviews, flag lots, and subdivisions. Administrative applications must be approved by the Planning Commission if the application demonstrates compliance with the approval criteria.

Background

The applicant is requesting approval of a Conditional Use Permit for a Pet Vacation Station (dog kennel) on a 3 acre lot in the AV-3 Zone. The Agricultural AV-3 zone allows dog breeding, dog kennels, or dog training schools on a minimum of three acres as a conditional use, with the following requirements:

- The number of dogs cannot exceed 10 dogs of more than 10 weeks old, per acre, at any time.
- Buildings or enclosures for animals shall be located not less than 100 feet from a public street and not less than 50 feet from any rear or side property line.

The kennel site is located on a 3-acre subdivision lot in Country Gardens Subdivision Phase 1. The lot has 244 feet of frontage with the proposed structure being at least 100 feet from 2300 North. The building, common area, and

outdoor kennel will be located in the middle of the property. The lot also has an existing house with an outbuilding. The kennel will be located more than 40 feet from the house. The proposal is to have between 2 and 20 dogs. The applicant is proposing a 30 foot by 50 foot air conditioned building for the dogs. There will be dog runs to the east of the building with pea gravel. A fenced common area that will be grassed will be to the north of the building. The applicant is proposing to plant trees in this area. The applicant is also proposing an asphalt drive from 2300 North to the building, and will have two parking stalls. The applicant is considering placing signs at the entrance of the asphalt drive to identify the entrance points to the dog day care. No business signs are being proposed at this time. Any signs will have to meet Title 110 Signs Chapter 2 (Ogden Valley Signs), and be approved by Planning Staff. The hours of operation will be 8:00 AM to 6:00 PM daily.

Summary of Planning Commission Considerations

- Does the proposed use meet the requirements of applicable County Ordinances?
- Are there any potentially detrimental effects that can be mitigated by imposing conditions of approval, and if so, what are the appropriate conditions?

In order for a conditional use permit to be approved it must meet the requirements listed under "Criteria for Issuance of Conditional Use Permit." The Planning Commission needs to determine if the proposed use meets these requirements.

Sec. 108-4-4 Criteria for issuance of conditional use permit:
Conditional uses shall be approved on a case-by-case basis. The Planning Commission shall not authorize a conditional use permit unless evidence is presented to establish:

1. Reasonably anticipated detrimental effects of a proposed conditional use can be substantially mitigated by the proposal or by the imposition of reasonable conditions to achieve compliance with applicable standards. Examples of potential negative impacts are odor, vibration, light, dust, smoke, or noise.

2. That the proposed use will comply with the regulations and conditions specified in the Land Use Code and other applicable agency standards for such use.

After reviewing this conditional use request staff has determined that the criteria listed above have been met in the following ways:

1. The potential detrimental effects of this kennel relating to noise, smell, and loose dogs have been reasonably mitigated. Noise is mitigated by the size of the lot, location of the building, the hours of operation, and the commitment to house excessively noisy dogs inside a building. The potential for foul smells is mitigated by removal of animal waste by double bagging with normal trash removal and the urine will be sprayed daily. Loose dogs have been mitigated by having a secure outdoor kennel, play area, and a building to secure the dogs.

2. The Ogden Valley Architectural, Landscape, and Screening Design Standards, Parking and Loading Space Vehicle Traffic and Access Regulations, and Ogden Valley Lighting code do no not apply because under section 108-2-3 Applicability "single-family residential use and its approved accessory shall be exempt". The Agricultural AV-3 states "dog kennels are allowed as an accessory use to a single family dwelling", therefore the only applicable standards in the Land Use Code that apply to this case are: setback for animals, which is 100 feet from a public street; 50 feet from the side or rear property lines; number of dogs (cannot exceed 10 dogs of more than 10 weeks old, per acre, at any time); and the area requirement of 3-acres. The applicant meets or exceeds these standards.

However, the applicant is proposing to do additional improvements as follows:

- No signs have been proposed except two entrance signs to identify the entrance location.
- The applicant is willing to providing an asphalt drive with two parking stalls at the building.
- The applicant is willing to construct a metal building with sound proofing insulation that will be air conditioned for the comfort of the dogs. The metal building will be painted the same color as the house.
- A grassed area of 420 square feet with 2 quaking aspens and an evergreen tree will be provided for the dogs.

Conformance to the General Plan

The proposed use complies with applicable County Ordinances and the Ogden Valley General Plan.

Conditions of Approval

- Requirements of the Weber County Engineering Division
- Requirements of the Weber-Morgan Health Department
- Requirements of the Weber County Building Inspection Division
- Requirements of the Weber Fire District
- Requirements of Weber County Animal Services

Staff Recommendation

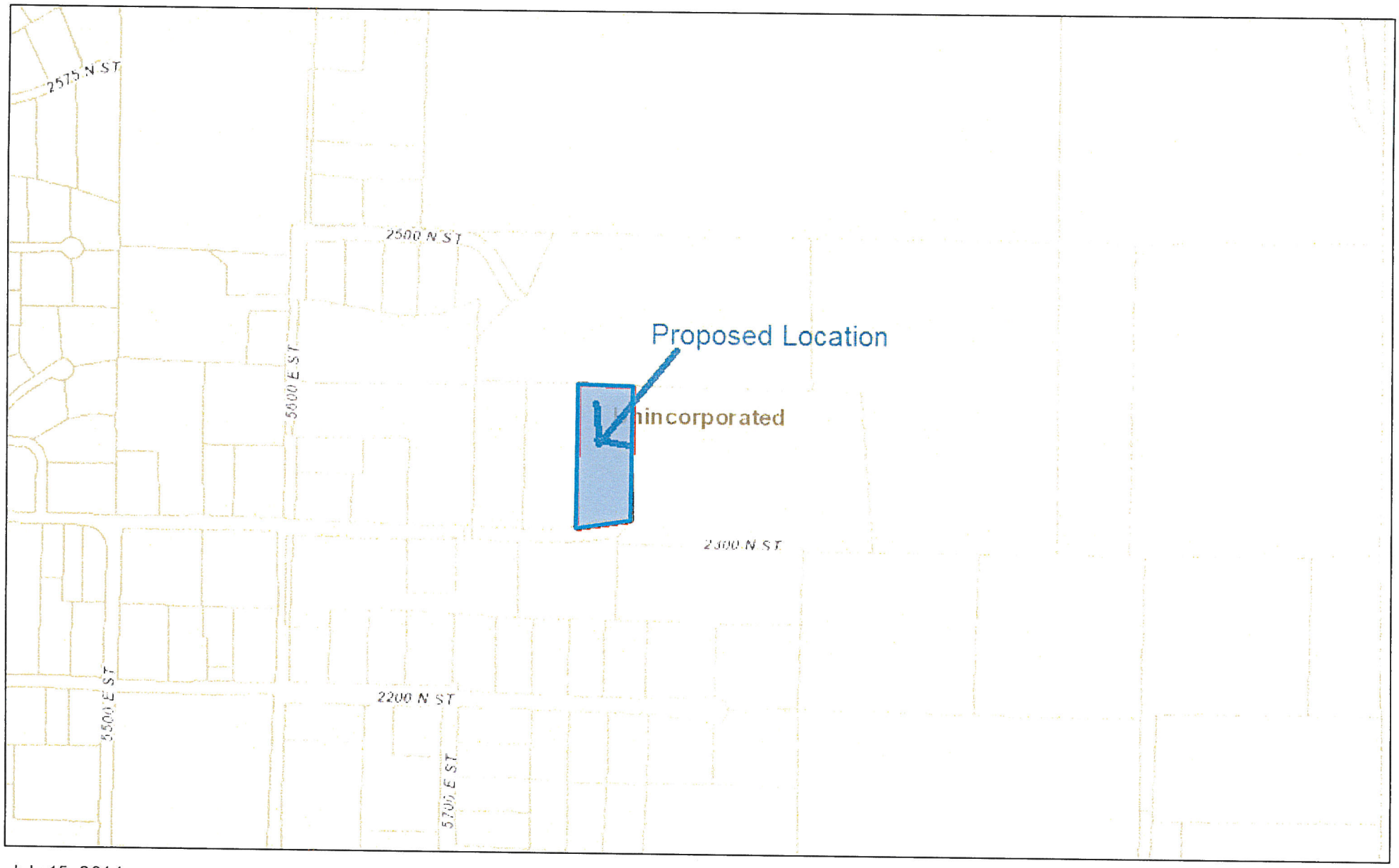
Staff recommends approval of CUP 2014-16 for a dog kennel in the AV-3 Zone, subject to staff and review agency requirements. This recommendation is based on the proposed kennel complying with applicable Land Use Code standards as listed in this staff report.

The decision of the Planning Commission may be appealed to the County Commission by filing such appeal within 15 days after the written decision of the Planning Commission.

Exhibits

A. Location Map
B. Site plan
C. Applicant's narrative
D. Additional information

CUP 2014-16



July 15, 2014

Street Labels

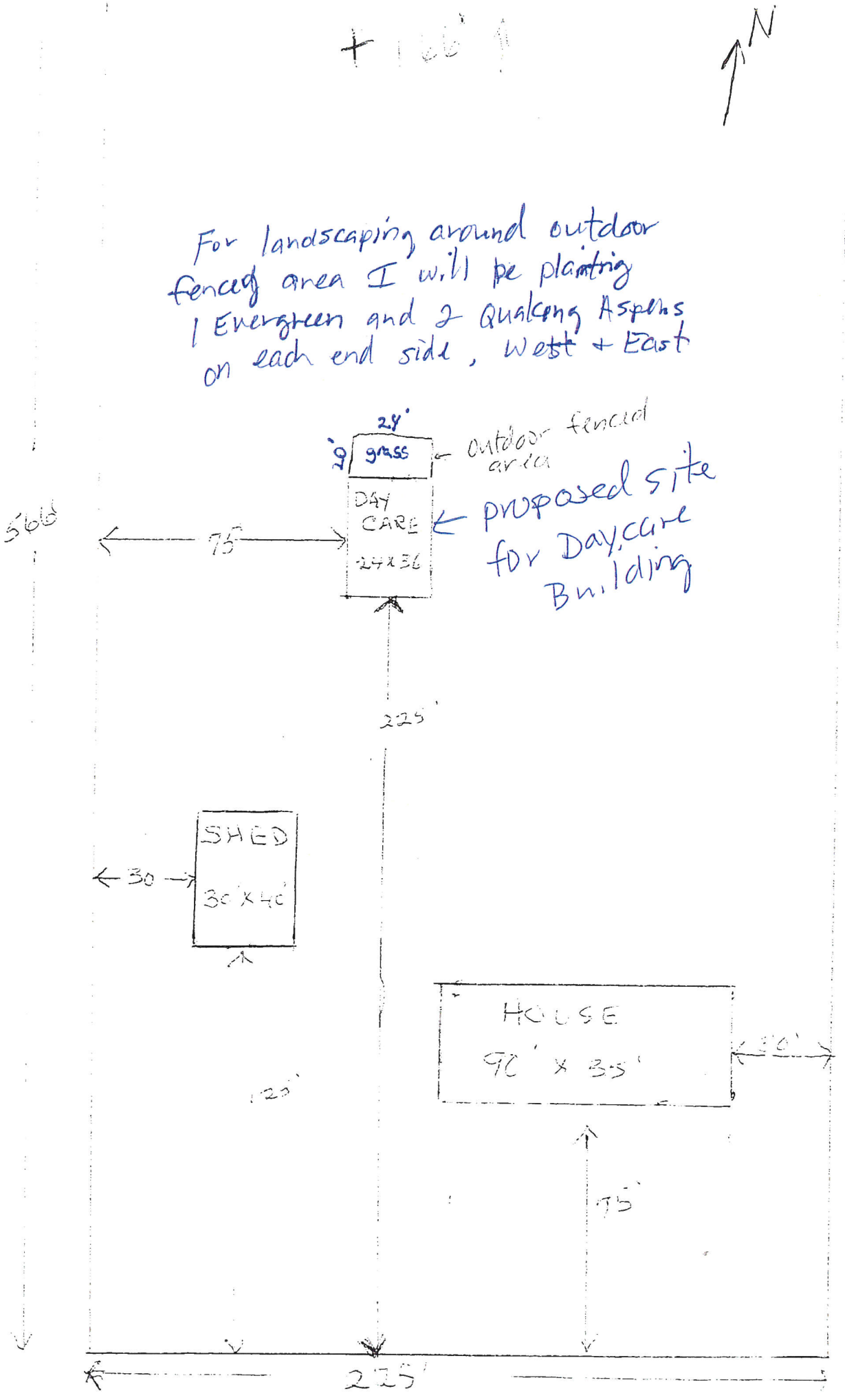
City Labels

1:9,028

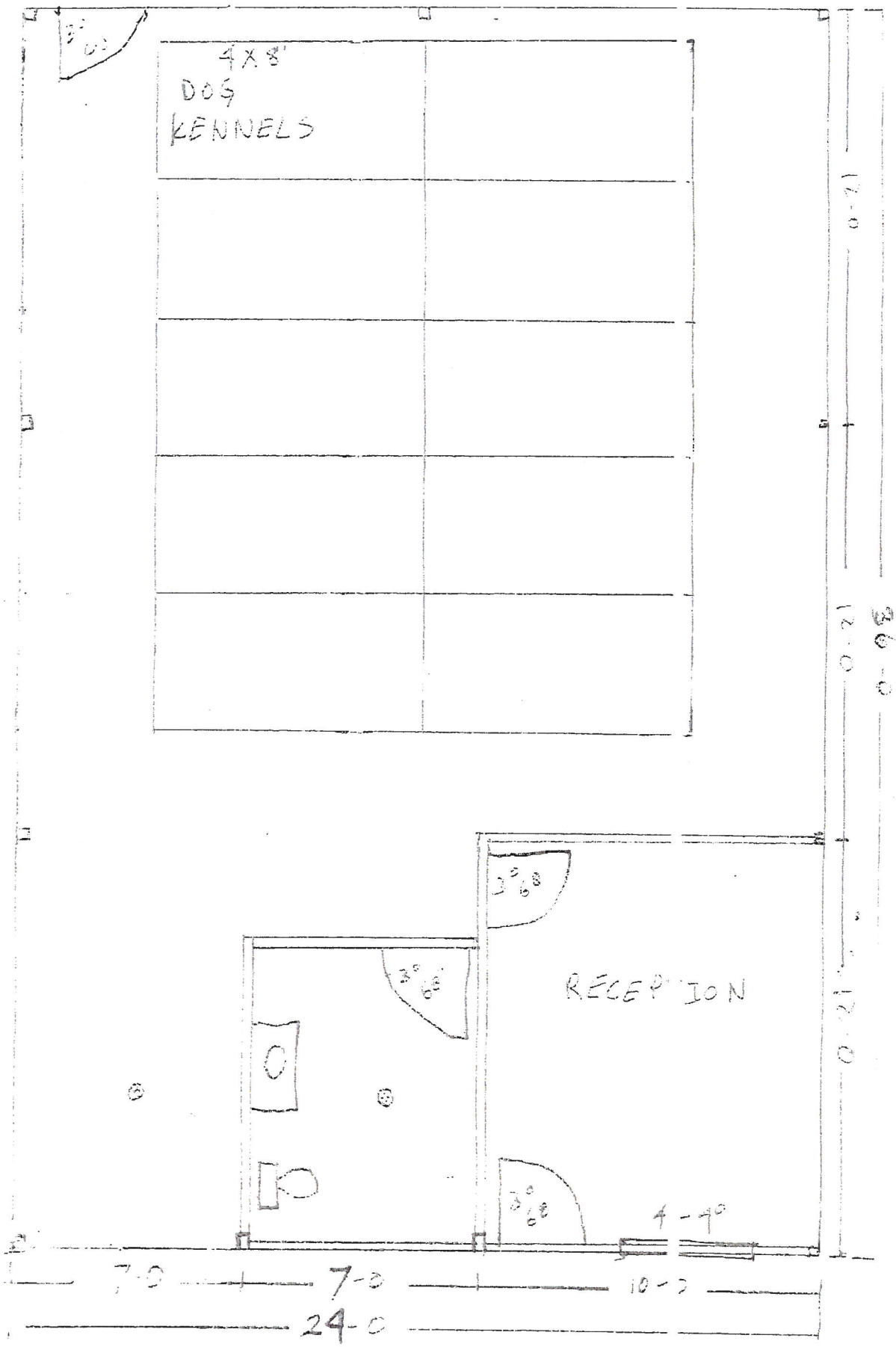
0 0.075 0.15 0.3 mi

0 0.1 0.2 0.4 km

Weber County


N
For landscaping around outdoor fencing area I will be planting 1 Evergreen and 2 Qualking Aspens on each end side, West + East
28'
grass
outdoor fenced area
DAY CARE
24x36
proposed site for Daycare Building
56'
75'
225'
SHED
30'x40'
30'
HOUSE
90' x 35'
30'
125'
75'
225'

Proposed Dog Day Care Building



Proposed
Dog Daycare
Building

Weber County Conditional Use Permit Application

Application submittals will be accepted by appointment only. (801) 399-8791. 2380 Washington Blvd. Suite 240, Ogden, UT 84401

Date Submitted / Completed	Fees (Office Use)	Receipt Number (Office Use)	File Number (Office Use)
6/26/14	225.00	3138	CUP 2014-16

Property Owner Contact Information

Name of Property Owner(s)	Mailing Address of Property Owner(s)
Stacey Bowman	5784 E. 2300 N. Eden, Ut. 84310
Phone: 801-390-1718 / Fax:	
Email Address (required): staceyjbowman@yahoo.com	Preferred Method of Written Correspondence: ☒ Email ☐ Fax ☐ Mail

Authorized Representative Contact Information

Name of Person Authorized to Represent the Property Owner(s)	Mailing Address of Authorized Person
Stacey Bowman	5784 E. 2300 N. Eden, Ut. 84310
Phone: 801-390-1718 / Fax:	
Email Address: staceyjbowman@yahoo.com	Preferred Method of Written Correspondence: ☒ Email ☐ Fax ☐ Mail

Property Information

Project Name	Total Acreage	Current Zoning
Your Pet's Vacation Station	3 acres	A-3

Approximate Address	Land Serial Number(s)
5784 E. 2300 N. Eden, Ut 84310	22-309-0003

Proposed Use: To board animals for people going on vacation.

Project Narrative:

I want to provide a safe and loving location ~~for~~ for those that are wanting to go on vacation and don't want to have to worry about their dogs. They can leave them with me and trust that they are receiving excellent care. I will have separate boarding kennels for nighttime as well as area's to separate the large dogs from the small dogs.

Basis for Issuance of Conditional Use Permit

Reasonably anticipated detrimental effects of a proposed conditional use can be substantially mitigated by the proposal or by the imposition of reasonable conditions to achieve compliance with applicable standards. Examples of potential negative impacts are odor, vibration, light, dust, smoke, or noise.

My building will be constructed to eliminate the noise of barking. It will be fenced so that no animals will be able to roam off. Their poop will be removed by double bagging and pickup removal. Urine will be sprayed down daily.

That the proposed use will comply with the regulations and conditions specified in the Zoning Ordinance and other applicable agency standards for such use.

All requirements will be met and will be done so according to all ordinances and other standards that are set for allowing to have this done.

7/29/14

To Whom It May Concern,

I spoke with James Barnhill who works with Utah State University Extension office. According to James, there are no laws that dictate the exact amount of space that a dog is required to have when placed in a care facility. He did direct me to do a couple of things. He first sent me links to a few sites which gave me information that suits dogs best while in at a care facility. He then suggested that I call the Weber county Animal control and call other Animal care providers and ask for their opinions. I have attached the links he suggested. I have read much of the content that those sites provide. I also spoke with my veterinarian Dr. Clayne White who also boards dogs. I have attached his opinions as well on another sheet. I have called 2 other daycare providers. The Dog Park in Woods Cross, Ut and Idelwire inSo. Ogden. I asked for information from them as to how they determined what size area was appropriate for the number of dogs that they allow.

After researching the listed reports and speaking with many professionals, I believe that the space and building that I have outlined in this report is more than adequate for what I am asking the planning commission to grant me that right to board up to 20 dogs.

Stacey Bowman

Subject: animal care

From: James Barnhill (james.barnhill@usu.edu)

To: Staceylbowman@yahoo.com;

Date: Tuesday, July 29, 2014 5:02 PM

Stacey,

Here are a few sites to look at.

http://oacu.od.nih.gov/disaster/ShelterGuide.pdf

http://www.sheltermedicine.com/shelter-health-portal/information-sheets/facility-design-nd-animal-housing

http://www.cga.ct.gov/2013/rpt/2013-R-0309.htm

James Barnhill

Utah State University Extension

7/31/2014

I met Dr. Clayne White, D.V.M at his facility ,listed below ,to interview h m regarding boarding dogs.

Bayview Animal Hospital and Boarding
677 Shepard Ln.
Farmington, Ut. 84025

He has been practicing at this facility since 1994. He offered me a great deal of valuable information in regards to building and operating my dog boarding business. His location can handle up to 100 dogs. I have included some photos that show his kennels and common areas. His area that houses the boarded dogs is roughly 40'x50'. The common area for outside is roughly 25'x40'.

He recommended that I use astro turf in the outside area. First a concrete pad is poured and then a rubber backing is laid out on the entire area and followed up with a layer of astro turf. This makes for easy maintenance and most importantly easy to keep clean. I will be implementing this in my outside area instead of grass. It will be sprayed down daily which will run to the gutter off of the cement pad which will be made when poured and then drain into our leach field

His kennels range in size, but for the sake of my establishment he showed me what would work best. His large kennels measure 4'x8' and can be divided into two 4'x4' sections for when my facility needs all spaces for 20 dogs. You can actually put 2 small to medium dogs in each side of a divided kennel. I would only need to provide 10 of these 4'x 8' kennels to board my max number of dogs. These kennels can be placed on top of each other as well for the sake of space . I have enclosed pictures as well.

Dr. White has given me permission to present this information to the county for the use of making a decision about my application for the conditional use permit which I have applied for. If there are questions that need to be asked Dr. White is happy to answer them.

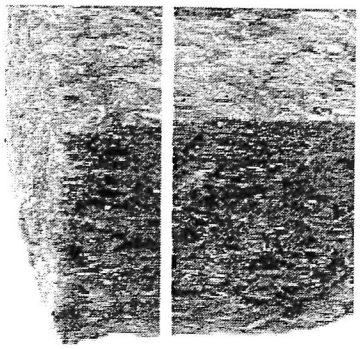
soundproofcow.com

PI ODUCT DATA SHEET

Quiet Batt® Soundproofing Insulation

Features & Benefits:

- **Excellent Sound Absorption Performance** - Quiet Batt® absorbs sound within wall and ceiling cavities, reducing the sound transfer from one space to the next. Quiet Batt® has the highest NRC obtainable of .95, which means it absorbs 100% of sound.
- **Keep it Green** - Quiet Batt® is manufactured with 80% recycled natural cotton fibers.
- **Excellent Flammability Rating** – Quiet Batt® has a Class A* flammability rating. This product passes most building code flammability requirements for exposed materials.
- **Easy to Handle** - Quiet Batt® is itch free and does not contain formaldehydes or other harmful chemicals.



General Information:

Quiet Batt® is a premium high-performance soundproofing insulation with thermal qualities. Acoustically, Quie : Batt® often out performs typical fiberglass, cellulose and foam insulations.

Quiet Batt® Soundproofing Insulation products are designed for interior and exterior walls, ceilings and attic a)plications. Our user-friendly home and commercial insulation materials are easy to install with minimal tools required. Quiet Batt installs with a tight friction fit between wood and metal studs to minimize sound and thermal energy transmission.

Quiet Batt® Soundproofing Insulation can be used separately or in conjunction with a variety of our other sour dproofing products. Quiet Batt® can be cut with a utility knife or simply tear off unneeded pieces.

Applications:

Professional and Home Theaters • Professional and Home Recording Studios • Offices • Homes, Condos nd Apartments
• Band practice rooms • Broadcast Studios • Workshops • Equipment Enclosures
Any environment that needs soundproofing

Acoustic Data:

frequency	125	250	500	1K	2K	4K	N	C*	SAA*
3 inch	.39	.86	.99	.92	.96	1.01	0	95	0.94

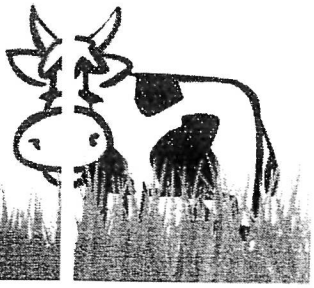
* NRC = noise reduction coefficient
*SAA = sound absorption average

continued on back of page

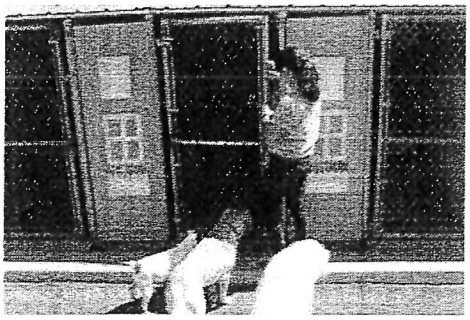
ADDRESS
Soundproofcow
440 Ramsey Avenue
Chambersburg, PA 17201

PHONE
P: 1-866-9499-COW
F: (717) 261-1790

WEB
www.soundproofcow.com



Dog Kennel & Daycare Soundproofing



Dog Kennel Soundproofing ...Why You Need It

Let's face it, there's no way to stop the noise of barking dogs. The only way to fix dog kennel noise issues is by installing proper dog kennel soundproofing.

Dog kennels, with their concrete floors and cinderblock walls, are perfect for creating unwanted echoes and amplifying noise. Because the surfaces are ha[illegible], sound waves bounce off them and back into the space. However, hard surfaces are easy-to-clean, which is important in your business.

Dog owners want to make sure their dog is happy. If they visit your kennel and hear the piercing sound of barking dogs, they won't want to use your kennel. Your business suffers.

Another common problem of dog kennels is complaints from neighbors. Barking dogs can disturb nearby homes and businesses.

Many dog kennel owners come to Soundproof Cow to fix their noise problems. Most don't realize how large of a problem the barking was until after they in[illegible]all dog kennel soundproofing products.

What Dog Kennel Soundproofing Can Do for You

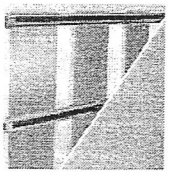
Dog Kennel Soundproofing products:

- Keep the noise of barking dogs within your building so you don't get complaints from neighbors
- Reduce the noise of barking dogs within your kennel....dog owners will be more likely to leave their dog in your care and your business will improve
- Provide a safe working environment for your employees by reducing the noise volume

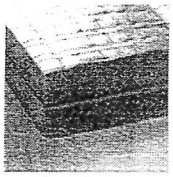
Dog Kennel Soundproofing Products

Quiet Barrier
Soundproofing Barrier

Quiet Batt
Soundproofing Insulation



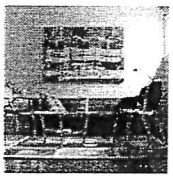
IsoTrax
Sound Isolation



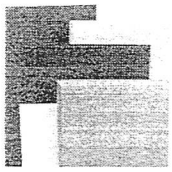
Quiet Barrier
Specialty Composite

Dog Kennel Sound Absorption Products

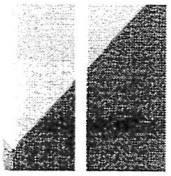
ADAPT -
Acoustical Treatments



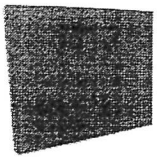
AFI
Acoustic Panels



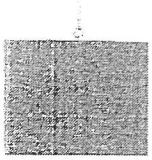
Fabric Wrapped
Acoustic Panels



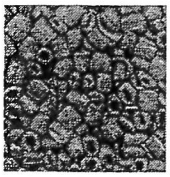
Fabric Wrapped
Acoustic Foam



Acoustic Foam Panel



Acoustic Hanging Baffles



Water Resistant Acoustic Panels

CONTACT
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Send Us a Message
Quality Us

ABOUT
About the Cow
Soundproof Cow?
Testimonials
Soundproofing 101

HELP
FAQ
Glossary
Terms & Conditions
Privacy Statement
Return Policy

SPECIAL
Special Offers
Quantities
Product Data Sheets
Custom Options
Photo Gallery
Video Gallery

MY ACCOUNT
Sign In
Register
Forgot Password
My Cart
Checkout

AWARDS
NeoCon 2011 Gold
ASAPT - Acoustics & Treatments

PAYMENT

Thermal Data:

3 in. Quiet Batt® Soundproofing Insulation	
overall density	1.20 lbs/ft³
average thermal conductance (c)	0.079 Btu/hr ft² °F
average thermal resistance (R)	12.7 hr ft2 °F/Btu
average thermal resistance (Rsi)	2.24 m2 K/W
average thermal conductivity (k)	0.275 Btu-in./hr ft2 ² °F

Product Availability and Coverage:

- box of 4 batts - 3 in. x 16 in. x 96 in. = 42.67 sqft
- box of 3 batts - 3 in. x 24 in. x 96 in. = 48 sqft

ADDRESS

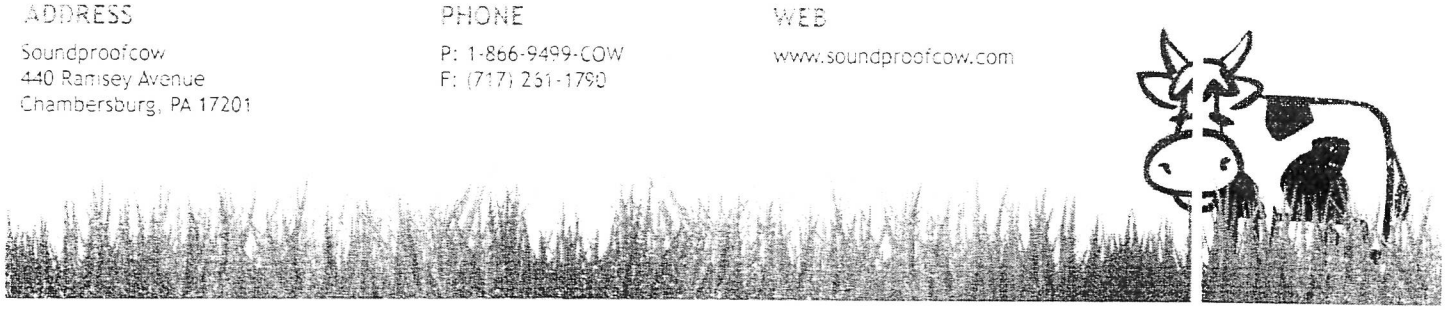
Soundproofcow
440 Ramsey Avenue
Chambersburg, PA 17201

PHONE

P: 1-866-9499-COW
F: (717) 261-1790

WEB

www.soundproofcow.com



Miranda Menzies
3807 N. Elkridge Trail,
P.O. Box 1130
Eden 84310

July 24, 2014

Ogden Valley Planning Commission
Weber County Planning Department
Weber Center
2380 Washington Blvd., Suite 240
Ogden, UT 84401

Re: Powder Mountain "Weber County Rezone Application – Destination and Recreation Resort Zone DRR-1

Dear Commissioners,

I am a resident of Eden, Utah, and these comments are made by me as a private citizen and not on behalf of any of the organizations with which I am associated as a volunteer or Board Member.

Please consider the following comments on the Powder Mountain "Weber County Rezone Application – Destination and Recreation Resort Zone DRR-1. This submission is based on Commission Chairman's statements on July 22, 2014 at the commission meeting, requesting comments on the Presentation and Master Plan filed by Summit Mountain Holding Group in support of this rezone application.

General Comments:

A. Density

There is a lot to like in the Master Plan overall. In particular, I support the clustered village development, goals of reduced water usage, and efforts to minimize the impact on the mountain environment.

However, on multiple occasions, at neighborhood public meetings and otherwise, SMHG have stated that their intent is to develop only 1000 units out of the 2800 units in the original Western American Holdings Development Agreement with Weber County (2006). In this July 2014 Master Plan, the 2800 development units are specifically cited in 3 or more places, including the breakout of development types on page 18. In other words the development plan now appears to be back to the original 2800 units. Then the Economic Benefit analysis (page 5) – Exhibit to the application is based upon 1000 units of single family or multi-family housing. It is unclear whether all of the other supporting calculations are based on 1000 DU or 2800 DU.

While I recognize that the 2002 development agreement exists, it now appears that SMHG is not being internally consistent in the plan, nor with the multiple representations they have made to the community. I suggest the plan be based on what they actually plan to do, while making reference to the 2800 entitlements as a footnote, not the primary subject of the Plan.

B. Trails

There is a statement (p41) that: *"all recreation facilities will be available to the public. Some uses will be fee-based such as skiing, guided events, spas etc"*. This implies that hiking, biking and equestrian trails will possibly be open and free to the public, or maybe not?

Trails which have existed and been used by the public for 20 years or more have a prescriptive easement under Utah statute. Many of these trails are mapped on old maps. The trails from top of Sundown Saddle to White Pine basin, the trail to Flat Top, and Sunridge Vista Loop Trails are shown on the Weber County hosted GIS map of trails (recreation layer) and duplicated on the Weber Pathways trail maps used by many of the public. The development plan appears to turn several of these into roads.

A clear statement by SMHG that these recreational hike/bike and equestrian trails, and others, will remain open and available to the public without charge would go a long way to allaying concerns of the hiking and biking public.

Specific Comments

The following specific editorial comments are offered in order to increase the completeness and accuracy of the Master Plan, and support its usefulness in the future:

1. Page 8 A statement is made that there are no historical or cultural resources at the project. However, previously there was much description of the history of the resort, including the work by Dr Alvin Cobabe the original resort owner and developer. At the top of the Timberline Lift, there is still the quite well-preserved saw mill used by Dr Cobabe and his team in construction of the original resort. Similarly the crane, now at the top of Hidden Lake Lift, which was used during original construction. I suggest these artifacts be considered "historical" during resort development, protected, and signage provided to enhance the visitor experience.

2. In multiple places the Plan describes how homes and other structures will be placed within forested areas. The need to remove deadwood and brush fuel should be emphasized (it is already noted), as should hard-scaping around the structures, in order to reduce the fire risk, and the consequent risk to the lives of our firefighters.

3. The transportation report is referenced, and the following comments refer to that Exhibit.
   - The transportation plan makes no mention of the construction traffic that will be caused by development of the resort. This is omitted from the estimated numbers of employee trips, and parking requirements. Note that the economic Benefit Analysis document from Weber County Economic Development Director indicates 743 annual construction jobs, throughout the project. This is the same order of magnitude as the projected number of resort employees (1010 or 1623 depending on which section you are reading), so the transportation needs of these employees should be considered.
   - Many of these construction vehicles will be loaded, and therefore heavy and slow going up on the SR 158. The same vehicles are potentially dangerous in case of brake failure coming down SR 158. Overall their omission from the Transportation Plan is puzzling and troubling. They will be seasonal to a large extent, but should be considered, if only to strengthen

SMHG's excellent suggestion of truck runaway ramps on the road (made at the public hearing).

- Section C of the transportation report states (no doubt correctly) that the average existing grade up SR 158 from Wolf Creek to the top is 9%. This plan section should also include a couple of sentences about the maximum grade, and the average grade over the one or two steepest ¼ mile sections (immediately above Lefty's Canyon confluence, and at the "last corner" below Mid-Mountain). I believe the grade on these sections exceeds 12 percent. These sections are what actually stops the 2-wheel drive cars in their tracks on snowy days. To have no mention of them is in my opinion misleading and incomplete presentation for the reader.
- The transportation report fails to consider the effect of the linkage proposed in the Ogden Valley Transportation Element, between North Divide and the Powder Mountain Road, with a junction at Fairways Drive. Much of this road is either already constructed or platted into sub-divisions. The consequence of its omission is that the assumptions of traffic distribution between North Divide and Ogden Canyon are likely erroneous (by 2019 Phase I completion). Similarly, recommendations for mitigation at Valley Market 4-way stop and at the Dam (SR-39 and SR-158) may be inappropriate.
- However, a roundabout at the Valley Market is likely a good idea as long as provision can be made for pedestrians, since there is now a walking trail crossing SR-158 on the south side of this junction (not shown in the transportation plan). See Figure 6 Area A. Consideration of pedestrians should be included for high pedestrian usage areas in the transportation plan.
- At the Dam junction (SR-39 and SR-158), placing a signal (suggested for mitigation) is possibly inconsistent with Federal and State guidelines or regulations for management of this "High Risk dam" due to seismic risk and consequent safety hazard. (This point was raised by a resident at a neighborhood meeting where Summit presented their ideas).
- The section on current parking capacity Section IV, fails to include parking capacity at Hidden Lake Lift, including Summit's new Sky Lodge parking area, which is 50 - 75 stalls, and is regularly used at higher percentage occupancy than the main parking lot at Timberline. It is the parking area of choice for many season ticket holders, who do not need to buy day-passes. The maps in the main report indicate that this is planned as a "mixed use area", but the parking demand still exists.

4. The seasonal workforce housing plan (page 43) is not clear with respect to the amount of housing to be provided at the mountain nor whether it is consistent with the Transportation Plan and the economic Benefit Analysis.

    a. The Master Plan talks about 1,623 full time equivalent employees in the main document, however the **estimated total [new] employees** shown on Transportation Plan Table 7 is 364 to 450 at Stage 1 and an additional 186 to 232 at Stage 2. New workforce trips estimated in the transportation plan is 683 (Tranportation Plan Table 8). Are these numbers consistent? Presumably these discrepancies are made up by mandatory employee public transit?
    b. As stated above, the Cost Benefit Analysis document from Weber County Economic Development Director indicates 743 annual construction jobs, throughout the project.

Are these included in the 1623 employees? Maybe, since the economic benefit analysis mentions 1010 direct employment jobs at the resort. However, using the Eden median salary is inconsistent with point 4d. below.

c. 984 workforce housing units and 98 seasonal employee workforce housing units are mentioned. Lower down a statement is made that Seasonal workforce will be housed at "Mid-Mountain", but the remaining 886 will be "off-site". Is this consistent with the Transportation Plan?

d. The last sentence at the end of this paragraph is incomplete/typographically erroneous, but appears to assume the workforce will be housed in Ogden Valley and Ogden. This is likely, but should also include North Ogden area, given the additional road connection via North Divide, commented on above in Item 3.

I appreciate your consideration of these review comments.

Sincerely,

Miranda Menzies

Resident of Eden.

801-745-2793

7149 E 1000 North
Huntsville, UT 84317

August 5, 2014

To: USDA Forest Service, Utah Highway Patrol, Weber County Sherriff, Weber County Commissioners, Ogden Valley Township Planning Commission, City of Huntsville, Ogden Pathways, Ogden Valley GEM Committee

Subject: TRAFFIC, PARKING, SANITATION, AND SAFETY ISSUES AT PINEVIEW RESERVOIR

We have lived on 1000 North where it intersects County Road 166 on the east side of Pineview Reservoir since 1991. This location has historically been heavily used by the public on weekends in the summer, and especially on holidays. However, this summer the crowds have greatly increased, raising the following recurring problems to levels of much greater concern:

- High risk for pedestrian/vehicle/cyclist accidents on the highway. The 50 mph speed limit is fine during most of the year, but on the hectic days it is downright scary. Vehicle parking along Highway 166 occasionally obstructs vision for vehicles turning onto the highway from 1000 North.
- High risk for pedestrian/vehicle/cyclist accidents on the bike/footpath (that is presently under construction) with vehicles crossing the path at any place along a 75 yard stretch.
- Noise. Our neighborhood is frequently subject to loud music and voices all day until late into the night.
- Sanitary issues. While there are latrines to the south at 'Pelican Beach' and within the 'Middle Inlet Beach' facility, it is likely that the large quantity of visitors between these two facilities do not use them.
- Litter/trash. After weekends, there is considerable trash surrounding small trash containers. We have lots of scavengers (magpies, raccoons, skunks, foxes, etc.) that can spread this waste.
- Vehicles parking on the bike/footpath (presently under construction, but we fear similar behavior when construction is completed).
- Potential for more public traffic and parking on our residential street.

We understand that the USDA plans to improve the parking facility at Pelican Beach (to the south of 1000 North). While we commend their initiative to improve that location, we are concerned that imposition of parking fees will cause further congestion in the immediate vicinity of 1000 North where no fees are charged. It seems that a comprehensive plan is needed to improve Pelican Beach and the area near 1000 North, and perhaps other hotspots around the reservoir. A comprehensive plan will hopefully reduce future accidents and enhance the experience of visitors and residents in this lovely recreation area.

We do not have solutions to all these problems, but we do propose that improvements will be most efficient if they are done with a comprehensive approach with input from all parties with vested interests. A piecemeal approach may just move the problems from one location to a neighboring location.

Some potential ideas aimed specifically at the problems in the 1000 North area are:

- Eliminate parking directly south and north of 1000 North on the east side of County Road 166 so that drivers attempting to turn left from 1000 North can see traffic in each direction. This could be accomplished with low berms or barriers.
- Larger trash bins.
- Signs (or other methods) to prevent non-resident parking on 1000 North, followed by enforcement.
- Possibly additional restrooms in this area.
- Enforcement of evening noise ordinances (on the water and on shore).
- Defined parking areas with defined access points. (If parking fees are to be assessed, we feel that they need to be uniform throughout the area in order to prevent overcrowding at low/no fee areas.)
- Strategic barriers, berms, and signs bordering the bike/footpath to keep it clear of vehicles.

Thank you for consideration of these issues.

Sincerely,

Donald H. Mitchell

Pamela J. Mitchell

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Estimated nitrate loadings from lawns, irrigated cropland, and on-site wastewater to an aquifer in Ogden Valley, Utah

T.N. Reuben and D.L. Sorensen

Abstract: Nitrate-nitrogen (NO_3-N) loadings to groundwater from irrigated croplands, lawns, and on-site wastewater drain fields were simulated using the Nitrogen Loss and Environmental Assessment Package-Geographic Information System (NLEAP-GIS) 4.2 model in Ogden Valley, Utah. The study determined the influence of domestic wastewater and nitrogen fertilizers applied to lawns and fields on NO_3-N loadings to the shallow, unconfined aquifer in the drainage area of the south fork of the Ogden River. Groundwater NO_3-N concentrations were estimated from the NLEAP-GIS 4.2 simulated leaching losses. Annual leaching rates (kg N ha^{-1} y^{-1}) from the drain-fields and the lawns were, respectively, more than 2.6- and 1.1-fold higher than from the croplands. Total leaching losses (kg N y^{-1}) from the croplands and lawns were, respectively, 70- and 50-fold higher than total loads from drain-fields. Lawns and drain-fields had lower total leaching losses than the cropland because the total area was smaller than the cropland. The model predicted that a 50% reduction in lawn fertilizer application rate would result in a 36% decline in leaching. A 50% reduction in irrigation water application rate only reduced predicted leaching by 18%. NLEAP was able to predict NO_3-N concentrations (1.9 ± 0.3 mg N L^{-1} [1.9 ± 0.3 ppm]) resulting from blending leachate into groundwater within the range of the NO_3-N concentrations measured in two wells in the study area. Predicted residual soil NO_3-N concentrations matched measured concentrations only where assumed initial NO_3 concentration and fertilization practices were reasonably accurate.

Key words: fertilizers—geographic information system—nitrogen leaching—Nitrogen Loss and Environmental Assessment Package—nutrient—total maximum daily load

Water quality deterioration in lakes and reservoirs is usually attributed to cyanobacteria and algae growth resulting from increasing concentrations of nitrogen (N) and phosphorus (P). Pineview Reservoir is one of the reservoirs affected by cyanobacteria and algae blooms. Most eutrophication control measures target P (Rast and Thornton 1996) as opposed to N. A total maximum daily load (TMDL) report by Tetra Tech (2002) and a preliminary bioassay study that we conducted in 2008 indicated that phytoplankton growth at Pineview Reservoir is limited by both N and P. The TMDL stated the need to reduce N and P loadings to the reservoir through control of nutrient loadings from irrigated land, on-site wastewater treatment systems, livestock manure, and rangeland. As is often the case in TMDL studies, the data used in the Pineview Reservoir study were sparse, and a recommendation was made for further studies of surface and groundwater contributions to the reservoir (Tetra Tech 2002).

Pineview Reservoir is located in Ogden Valley, approximately 11 km (7 mi) east of Ogden City and adjacent to Huntsville Town in Weber County, Utah. The reservoir has a storage capacity of approximately 140 million m^3 (110,000 ac ft) (Weber Basin Water Quality Management Council 1990; Winkelaar 2010). Pineview Reservoir receives water from both surface and groundwater sources. Groundwater inflows are mainly from the shallow, unconfined (water table) aquifer that is separated from the underlying confined aquifer by a very slowly permeable silt-clay layer (Avery 1994, Snyder and Lowe 1998, Tetra Tech 2002).

Subsequent ground and surface water studies have been aimed at deepening understanding of proportionate contributions of ground and surface water towards N and P loads. Reuben et al. (2011) reported that the water table aquifer NO_3-N and total dissolved P loadings to Pineview Reservoir were, respectively, 22% and 3% of the total annual loads but the aquifer contributed only 2% of the total reservoir inflows.

Research findings by Reuben et al. (2011) prompted investigation of groundwater flows and nutrient loadings from the water table aquifer to Pineview Reservoir. Hydraulic conductivities for two groundwater monitoring wells (wells 4 and 8, figure 1) located in Huntsville Town (sector 48) represented the lower (0.86 m d^{-1} [2.8 ft day^{-1}]) and upper (22 m d^{-1} [72 ft day^{-1}]) limits of the hydraulic conductivities observed in all nine water table aquifer wells surrounding the reservoir. Well 8 had the lowest minimum NO_3-N concentration while the NO_3-N concentrations from well 4 were consistently higher than most of the other eight monitoring wells.

The objectives of the present study were to estimate the NO_3-N contributions from irrigated agriculture, lawns, and on-site wastewater discharges to groundwater in sector 48, and identify management practices for controlling the loadings. These objectives were chosen because the groundwater proportion of NO_3-N contributions to the annual reservoir loadings was disproportionate to its inflow contribution and much higher than that of P (Reuben et al. 2011).

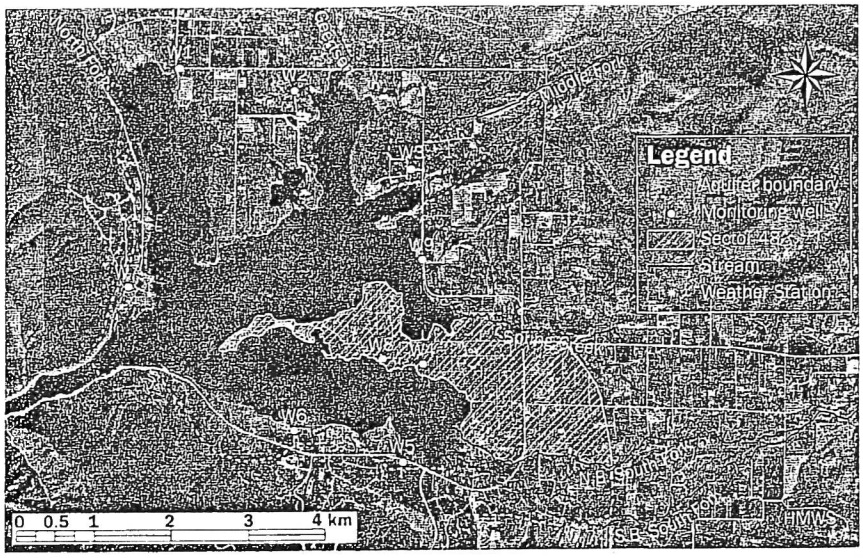
Materials and Methods

Nitrogen leaching was modeled to gain insight to its loading into groundwater entering Pineview Reservoir, Utah, United States, and to explore management practices needed to control the losses.

Study Area. This study was conducted in the Huntsville area because (1) the range for the hydraulic conductivities for the monitoring wells in this area (wells 4 and 8) bracketed the range measured across the entire water table aquifer and (2) analysis of variance

Thomas Nyanda Reuben is a postdoctoral research associate, and Darwin L. Sorensen is an adjunct professor at the Utah Water Research Laboratory at Utah State University in Logan, Utah.

Figure 1
Map of Ogden Valley (ESRI, Redlands, CA) showing sector 48, the ground water monitoring wells (W1 through W9), streams, and the Huntsville Monastery Weather Station (HMWS).



showed that the means of the NO_3-N concentrations from wells 4 and 8 were statistically different ($p < 0.05$) in 2011. The study principally consisted of performing and analyzing geographic information systems (GIS) based Nitrogen Loss and Environmental Assessment Package (NLEAP-GIS 4.2) (Delgado et al. 2010) simulations of NO_3-N leaching from irrigated cropland, lawns, and on-site wastewater drain fields overlying the water table aquifer in sector 48 (figure 1). It was conducted for two years, from January 1, 2010, through December 31, 2011.

Groundwater in Ogden Valley exists in perched, confined (artesian), and unconfined (water table) aquifer formations. Pineview Reservoir was finished in the silt-clay layer that separates the confined aquifer and the shallow unconfined aquifer in the center of the southern part of the valley (Avery 1994). Groundwater inflows to the reservoir are mainly from the shallow, unconfined aquifer which is primarily recharged by precipitation, irrigation, seepage from streams, and groundwater flow from an adjacent unconfined aquifer beyond the artesian aquifer boundary (Avery 1994; Snyder and Lowe 1998; Tetra Tech 2002). The average annual precipitation in Ogden Valley is 558 mm (22 in) (WRCC 2012). Precipitation in the valley is snow dominated and the high mountain areas receive the highest snowfall (Tetra Tech 2002). Another source of recharge for the shallow unconfined aquifer in Ogden Valley is wastewater disposal from on-site wastewater treatment systems (OWWTS).

Nitrogen Loss and Environmental Assessment Package Characteristics. Nitrate-nitrogen leaching simulations for irrigated croplands, lawns, and OWWTS drain fields in sector 48 were conducted using NLEAP-GIS 4.2 following procedures outlined by Delgado et al. (2010). The program has a Microsoft Excel user interface for imputing soil layer data, climatic data, and management scenarios for which simulations of N pools and pathways in the environment are conducted. Simulation outputs are displayed in Excel and can be exported to GIS through a GIS database file link (Delgado et al. 2010; Shaffer et al. 2010). NLEAP-GIS 4.2 was used because, (1) it is easy to access and process online soil and climate data, (2) it has the capability to facilitate examination of NO_3-N pools and transport at field and watershed scales, and (3) output GIS layers are a visual tool that simplifies planning and/or implementation of site-specific best management practices.

General Assumptions. The following simplifying assumptions were applied in the simulations: (1) no surface application of on-site wastewater; (2) no direct discharge of septic system effluent into groundwater, i.e. the drain fields, were designed and installed following guidelines and regulations stipulated by the US Environmental Protection Agency (USEPA 1995, 2002); (3) initial soil NO_3-N concentration was uniform in the study area (NRCS 2012a); and (4) nutrient movement from the reservoir to the shallow unconfined aquifer was negligible because daily water table elevations in the wells were, with one minor exception, greater than corresponding reservoir elevations.

Modeling Approach. The crops for which the simulations were conducted were alfalfa (*Medicago sativa*), spring wheat (*Triticum aestivum*), grass pasture, grass hay, and turf grass. A GIS shapefile with geographic locations of respective crop fields was obtained from the Natural Resource Conservation Service (NRCS) field office in Ogden, Utah, in 2009. Impervious surfaces were removed from the shapefile using the editor toolbar environment in Arc GIS. Missing crop field and lawn parcels were manually added to the shapefile based on 2012 Google imagery. NO_3-N simulations for the croplands and lawns were run for seven years (2005 through 2011) and drain fields, were run for five years (2007 through 2011). The years for which simulation results were compared were 2010 and 2011. The other years were incorporated in the simulations to ensure that near steady state conditions existed. A paired *t*-test showing no significant difference ($\alpha/2 = 0.025$, $t = 1.97$, $df = 276$) between the 2010 and 2011 monthly soil residual (NO_3) means for all crop/soil combinations indicated that these conditions had been attained.

Climatic Data. Climatic data for the Huntsville Monastery Weather Station (figure 1) were downloaded from the Water Resources Center website (WRCC 2012) for the period from January 1, 2005, through December 31, 2011. Missing climatic data (~10%) were imputed by linear interpolation. The censored climatic data were formatted and saved as a text file that was uploaded into the NLEAP-GIS 4.2 user interface through the program's convert climate tool (Delgado et al. 2010).

Fertilizer Applications. Input data on fertilizer application rates to crops were obtained from the Utah Fertilizer Guide (USU Cooperative Extension 2010) and James Barnhill (personal communication, June 20, 2012). Crop water requirement and irrigation interval data were obtained from a crop consumptive use report prepared by the UAES (1994). Data on fertilizer and irrigation application rates for lawns were obtained from Sagers (1990) and the Utah Department of Water Resources website (UDWR 2012), respectively. The actual amount of irrigation water applied to the croplands was estimated

Table 1
Properties of soils present in sector 48 (Huntsville Town area) in Ogden Valley, Utah (NRCS 2012a).

Soil series	Taxonomic class	Bulk density ($g\ cm^{-3}$)	Organic matter content (%)	Water holding capacity ($mm\ m^{-1}$)		Drainage properties
				FC	PWP	
Canburn silt loam (Cb)	Fine-loamy, mixed, superactive, calcareous, frigid Cumulic Endoaquolls	1.39	1.92	340	170	Poorly drained
Eastcan loam (EaA)	Fine-loamy, mixed, superactive, mesic Cumulic Haploxerolls	1.31	1.87	340	170	Moderately well drained
Parleys loam (PaA)	Fine-silty, mixed, superactive, mesic Calcic Argixerolls	1.31	1.32	330	170	Well drained
Phoebe fine sandy loam (PhA)	Coarse-loamy, mixed, superactive, mesic Vitrandic Haploxerolls	1.42	1.47	230	120	Well drained
Sunset loam (SwA)	Coarse-loamy, mixed, superactive, mesic Oxyaquic Haploxerolls	1.5	1.29	310	150	Somewhat well drained

Notes: Initial residual nitrate-nitrogen = 22.5 kg N ha^{-1}. FC = field capacity. PWP = permanent wilting point.

by dividing the crop water requirements by 0.6, the average application efficiency for conventional furrows and basins (with or without furrows) computed from efficiencies reported by Eisenhauer et al. (2011).

Soil and Water. Soil data for the Ogden Valley were downloaded from the NRCS Soil Survey Geographic (SSURGO) online database (NRCS 2012a) using NLEAP-GIS 4.2 soil download tool (Delgado et al. 2010). Properties of the soils present in sector 48 in the valley are summarized in table 1. Irrigation water was assigned a NO_3-N concentration of 0.25 mg N L^{-1}, the arithmetic mean for the south fork of the Ogden River (31 observations from the north branch and 32 from the south branch of the south fork) from January 1, 2010, through August 22, 2011. The south fork of the Ogden River provided most of the irrigation water in sector 48.

Lawns. Turf grass was not among the list of crops included in NLEAP-GIS 4.2 crop input file. Use of silage corn (*Zea mays* L.) (whose properties were in the list) as a surrogate crop to turf grass was recommended by Jorge Delgado (personal communication by email, June 28, 2012), since they both belong to the grass family (*Poaceae*), have similar rooting systems, and their uptake of N per unit dry matter are comparable (9 to 15 g N kg^{-1} in silage corn and 13 to 36 g N kg^{-1} in turf grass) (Hermanson et al. 2000). A turf grass crop with similar properties to those of corn silage was added to the crop input file to serve the purpose The expected yield was changed from 44.8 t ha^{-1} (20 tn ac^{-1}) (for corn silage) to 6.7 t ha^{-1} (3 tn ac^{-1}) for grass.

Fertilizer applications to the lawns were at a rate of 49 kg N ha^{-1} (1 lb N per 1,000 ft^2) and an application interval of 5 weeks (Sagers 1990) during the months of April through September. Planting and harvesting of perennial crops on farmland were assumed to occur every year because the capability for maintaining the same crop stand year after year was not available. Weekly harvests of turf were incorporated in the simulation to represent weekly mowing (hence the turf was considered a multicutting crop like alfalfa). Cuttings were not removed from the lawns to mimic the practice followed by most lawn owners. The last harvest event in each year occurred in November to ensure that the cold months of the year did not have any turf grass inputs. It was assumed that the effect of the turf on NO_3-N pools and transport during this time of the year would be negligible due to freezing conditions and grass dormancy. Annual "replanting" of the turf was scheduled in April to mimic springing up of a hypothetical perennial turf stand. It was assumed that NO_3-N uptake by the replanted turf would be essentially the same as that of revitalizing dormant plants.

Input parameters for water application to the lawns included sprinkler irrigation at recommended application rates of 13 mm (0.5 in) per irrigation event and varying irrigation intervals of 6 days in April and September, 4 days in May, 3 days in June through August, and 10 days in October (UDWR 2012). The recommended irrigation application rate was lower than the rate (25.4 mm [1 in]) at which average Utah homeowners watered their lawns (UDWR 2012). It was befitting to use the recommended irrigation application rates because fertilizer applications to the lawns were also based on the recommended rates.

Lawn Water and Fertilizer Application Rate Assessment. Lawn simulation for a 50% lower N application rate than the recommended 49 kg N ha^{-1} (43.6 lb ac^{-1}) per application was conducted to test its effect on N losses and residual. A similar comparison was made between simulation results for an irrigation application rate of 12.7 mm (0.5 in) and 25.4 mm (1 in) per irrigation event.

Septic System Drain Fields. NLEAP-GIS 4.2 did not have a provision for simulation of septic system effluent applications to drain fields but had the capability to simulate application of wastewater treatment plant sludge by injection or incorporation. A suggestion to simulate septic system effluent as wet sludge application by injection was considered reasonable for uniform applications according to Jorge Delgado (personal communication by email, June 28, 2012). The input data requirements for a sewage sludge simulation in NLEAP-GIS 4.2 were the mass loading rate of wet sludge, sludge water content (%), carbon (C):N ratio, and the percent (dry basis) organic matter (OM), NO_3-N, and ammonium (NH_4-N) content (Delgado et al. 2010). The septic effluent application to each drain-field was assumed to be uniformly distributed, and at the design rate of 568 L d^{-1} (150 gal day^{-1}) per bedroom served (USEPA 2002, 1995). The properties of the simulated septic effluent were 0.01% for NO_3-N, 0.09% of NH_4-N in the suspended solids (USEPA 1995), and a C:N ratio of 10, and 0.05% OM in the total mass of effluent applied.

The C:N ratio for septic effluent was based on the report that it rarely exceeds 10

(Judith Sims, Utah State University, personal communication by email, October 31, 2012) and on the C:N ratio for microbes (Brady 1977). The percent OM was estimated from a septic effluent five day biological oxygen demand (BOD_5) of 240 mg L^{-1} (240 ppm) for La Pine, Oregon, septic systems reported by WSDH (2004). The septic effluent BOD_5 was converted to chemical oxygen demand (COD) (Lawton and Codd 1991) using a BOD_5/COD ratio of 0.37 (Eckenfelder and Musterman 1995). The COD was converted to effluent C concentration on assumption that all of the COD is due to the oxidation of C to carbon dioxide (CO_2). The resulting C concentration (243 mg L^{-1} [243 ppm]) was multiplied by 1.97 to obtain OM concentration (Howard 1965).

The effluent mass loading rate was estimated from the number of bedrooms served by each drain-field, the design application rate, drain-field area, the density of water, and the total mass of solids. The total organic solids mass that would contribute nitrogenous compounds was assumed to be the concentrations of dissolved (OM) and suspended solid constituents (TSS). The TSS concentration was 48 mg L^{-1} (48 ppm) based on reported median septic system effluent concentration for La Pine, Oregon (WSDH 2004). The concentration was close to the minimum USEPA representative TSS concentration of 50 mg L^{-1} (50 ppm) for septic system effluent (USEPA 2002, WSDH 2004). Septic system effluent water content was estimated by deducting the estimated total solids percent of 0.05% (527 mg L^{-1} [527 ppm] total solids computed using the preceding steps) from 100%.

Data (in Microsoft Excel and GIS shapefile formats) on the number of bedrooms per housing unit, and sizes and geographic locations of the drain fields for permitted OWWTS were obtained from the Weber-Morgan Health Department in 2012. All residential housing units in sector 48 were assumed to have OWWTS despite not being included on the list of permitted housing units supplied by the Health Department. Approximately 60% of the residential units in sector 48 did not have number of bedroom and drain-field area data. These were assigned the median number of bedrooms per housing unit and the median drain-field area computed from the available data's nearly geometric distributions. An intercept of the drain-field GIS spatial layer with the soil type layer (NRCS 2012a) for sector 48 resulted in 322 drain-field locations. The septic effluent mass loading rates applied in the NLEAP-GIS 4.2 drain-field simulations had a median of 217 t ha^{-1} y^{-1}, a mean of 220 t ha^{-1} y^{-1} and a sd = 150 t ha^{-1} y^{-1} (median 97 tn ac^{-1} yr^{-1}, mean 98 tn ac^{-1} yr^{-1}, and sd 67 tn ac^{-1} yr^{-1}). The effluent loading rates were grouped into 14 discrete 10 t ha^{-1} d^{-1} (4.5 tn ac^{-1} day^{-1}) bins. The bins were represented by the bin averages that ranged from 80 to 612 t ha^{-1} d^{-1} (36 to 273 tn ac^{-1} day^{-1}).

General Farming Practices. Tillage operations for the croplands, lawns and drain fields were only applied in the first year of the rotation to mimic reported farming practices for Ogden Valley according to James Barnhill (personal communication, June 20, 2012). Crop planting occurred on April 20, each year based on UAES (1994). Alfalfa fields had a six year crop rotation under which the first year was planted to spring wheat and the next six years alfalfa according to James Barnhill (personal communication, June 20, 2012). No rotations were employed for the grass pasture, grass hay or turf grass. A monoculture of spring wheat was simulated as a baseline scenario. Under this management practice, the events carried out for the spring wheat planted in the first year of the alfalfa/wheat rotation were simulated for seven years. Incorporation of a baseline crop in the simulations mimicked the approach followed by Shumway et al. (2012) who used a corn monoculture. It is common practice in Ogden Valley for drain fields to be overlain by sprinkler-irrigated grass lawns hence other events imputed into NLEAP-GIS 4.2 for simulation included planting, irrigation, and harvesting of the grass. Management practices for the drain-field grass were the same as those discussed under lawn turf except that the drain-field grass did not receive any commercial fertilizers to isolate drain-field NO_3-N contributions from those of the lawns. More details about the cropping events are presented in table 2.

Groundwater Nitrate-Nitrogen Concentration Estimate. Daily groundwater flow data for sector 48 were extracted from a flow spatial distribution raster shapefile developed by creating a spatially joined point feature shapefile with observed daily locational reservoir and water table elevations that were interpolated through a kriging procedure in ArcGIS 3D Analyst. A semivariogram model fitted with an exponential equation was applied in the kriging procedure. The daily reservoir water surface elevations were obtained from the US Bureau of Reclamation online database (Bureau of Reclamation 2012) and converted to meters above mean sea level using the US Army Corps of Engineers' corps conversion (CORPSCON) 6.0 software. Water table elevations in 9 wells surrounding Pineview Reservoir (figure 1) were monitored using pressure loggers for 198 days at 12 hour intervals. The water elevation data were pressure compensated (Rasmussen and Crawford 1997) with barometric pressure data from a weather station located on the bank of the reservoir. An attributes table of daily reservoir and water table elevations was spatially joined with a point feature shapefile comprising 9 well locations and 290 reservoir points. The reservoir points were arbitrarily assigned throughout the reservoir to constrain water table contours from crossing the reservoir. Water surface elevations on each day were assumed to be uniform across the reservoir. Hydraulic gradients were computed from the spatial joint using the slope function in the 3D Analyst toolbar.

Hydraulic gradient cells representing well locations were clipped and the resulting clip alongside computed flow cross sectional areas and hydraulic conductivities measured at the well locations, were used to compute groundwater flows. The measured hydraulic conductivities were log transformed (Loáiciga et al. 2006; Zhai and Benson 2006; Verbovšek 2008; Buckland 1987) and a kriging procedure applied. Antilogarithms of the kriging output were used in the flow computations. The flows were interpolated by kriging to establish their spatial distribution. The interpolated flows were log-transformed to give the data near log normal distribution. Kriging output data whose magnitudes were less than or equal to 10^{-6} ($m\ d^{-1}$ or $m^3\ d^{-1}$, respectively) were screened out because, (1) their contributions to the flows and/or loads were assumed negligible; and (2) most of the data cells with such values were in the reservoir. The geometric means and sd of the resulting flow datasets were used to construct ± 1 sd confidence intervals for each day. This was similar to the procedures of Delhomme (1978).

The daily flows and corresponding sums of the NLEAP GIS 4.2 simulated NO_3-N leaching losses (from the croplands, lawns, and drain fields) for May 1 through November 14, 2011, were used to estimate

Table 2
Management scenario events for nitrate-nitrogen (NO_3-N) pool and pathway simulations for sector 48 croplands, lawns, and drain fields. All data was obtained or modified from the literature (Beddes and Kratsch 2008; Sagers 1990; UAES 1994; UDWR 2012; USU Cooperative Extension 2010).

Management scenario	Length of growing season (days)	Irrigation depth (mm y^{-1})	Fertilizer N applied (kg N ha^{-1} y^{-1})†
Alfalfa/wheat rotation*	163 (125)	1,231 (835)	0 (112)
Turf grass	179	610	245
Wheat monoculture	125	835	112
Drain-field	179	610	0
Grass pasture	174	957	56
Grass hay	174	1,077	26

*Values in parentheses are for a spring wheat crop grown in the first year of the rotation.
† Urea ($[NH_2]_2CO$) fertilizer.

groundwater NO_3-N concentrations. The geometric mean (0.4 mg N L^{-1} [0.4 ppm]) of the background concentration data collected for the study reported by Wallace and Lowe (1998) was added to both the upper and lower limits of the 95% confidence interval for the resulting concentrations. The additions were based on the assumption that sector 48 received a steady inflow of groundwater with a mean concentration of 0.4 mg N L^{-1} (0.4 ppm) from the up-gradient, deep, unconfined aquifer. The 95% confidence interval for the mean predicted groundwater NO_3-N concentration was compared with the confidence interval for (six sets of) measured concentrations from wells 4 and 8.

Nitrate Residual Validation and Sensitivity Analysis. Soil sample cores, 2.2 cm (0.9 in) in diameter and 33 cm (13 in) deep, were collected on July 23, 2013, for soluble NO_3-N analysis from the lawn of a public building, a residence, and a public park in Huntsville. An actively grazed horse pasture and a grass hay field in Huntsville were also sampled. An alfalfa hay field and a nearby barley (*Hordeum vulgare* L.) field were sampled within the study area east of Huntsville. The core samples were analyzed for NO_3-N, at the Utah State University Analytical Laboratory using the calcium hydroxide ($Ca[OH]_2$) extraction and chromotropic acid colorimetry procedure of Sims and Jackson (1971). Nitrate-nitrogen results were compared with the residual NO_3 predictions from the NLEAP-GIS 4.2 simulations for July of 2010 and 2011.

Sensitivity analyses were conducted to test the response of NO_3 leaching to variations in soil organic matter content, turf grass total N uptake (TNU), and C:N ratio, respectively. The sensitivity analyses were done by conducting successive NLEAP-GIS 4.2 simulations after increasing or decreasing the magnitude of one input variable by 25% or 50% each time.

Results and Discussion

Nitrate-Nitrogen Leaching Estimates. Summary statistics for the mean annual NO_3-N leaching losses for 2010 and 2011 are presented in table 3. Lawns and drain fields were predicted to have NO_3-N leaching rates of 184 ± 21 N ha^{-1} y^{-1} and 76 ± 16 kg N ha^{-1} y^{-1} (164 ± 19 lb N ac^{-1} yr^{-1} and 68 ± 14 lb N ac^{-1} yr^{-1}; mean ± 1sd), respectively. The high leaching rates from lawns, approximately 77% of the fertilizer N applied each year, may be attributed to high fertilizer application rates to maintain high quality (Sagers 1990). Similarly, high sewage effluent N loading rates into well drained soils resulted in high leaching rates from the drain fields. The influence of soil drainage type on NO_3-N leaching rates can be observed from figure 2. Only the median sewage management scenario (217 t ha^{-1} d^{-1} [97 tn ac^{-1} day^{-1}] application rate) has been presented in figure 2 because it was the only one whose respective drain fields existed in all the six soil types present in sector 48. The annual leaching rate for all the drain fields was similar to the leaching rate of 75 ± 15 kg N ha^{-1} y^{-1} (67 ± 13 lb ac^{-1} yr^{-1}) from the fields under the median sewage effluent application rate. Leaching rates from the drain fields may have been underestimated because of NO_3-N uptake by the overlying grass.

The spatial distributions of the mean annual leaching rates (kg N ha^{-1} y^{-1}) from simulations of various management scenarios during the period from January 1, 2010 through December 31, 2011 are presented in figures 3 through 5. The mean annual leaching rates from lawns and drain fields were generally higher than crop fields. The crop field map (figure 5) shows that alfalfa fields had the least NO_3-N leaching losses compared to the other crops. This resulted because the alfalfa fields received no N fertilizer applications during the last six years of the alfalfa/wheat rotation since the alfalfa/*Rhizobium* association fixes N. The concentrations of NO_3-N available to leach from the alfalfa root zone have been observed to be relatively low (Toth and Fox 1998; Meisinger and Delgado 2002; Basso and Ritchie 2005). The results of the simulation are, in general, consistent with these observations.

The baseline scenario (wheat monoculture) reported lower NO_3-N leaching rates (15 ± 6 kg N ha^{-1} y^{-1} [13 ± 5 lb N ac^{-1} yr^{-1}]) than other crop management practices except the alfalfa/wheat rotation. The relatively low leaching rates from the baseline scenario compared to grass and pasture fields reflected the high NO_3-N uptake capabilities of a wheat crop. This would signify the role of wheat (and any similar crop such as other small grains or corn) in lowering the soil residual NO_3 pool thereby reducing NO_3-N leaching potential. The baseline scenario map also portrayed that well-drained soils associated with low organic matter content (table 1) had higher leaching rates than the other soils. Soil organic matter increases both the nutrient and water retention capacity of the soil (NRCS USDA 2003) hence well drained soils with low organic matter content will likely have relatively high NO_3 leaching rates.

The simulated mean annual contributions of the cropland, lawns and drain fields to the soil NO_3-N pool and various losses in sector 48, are presented in table 4. The overall contribution of drain fields (200 kg N [440 lb N]) to NO_3-N leaching in this sector was 50-fold and 70-fold lower than those of the lawns (10,000 kg N [22,000 lb N]) and cropland (14,200 kg N [31,100 lb N]), respectively, despite drain fields having a similar leaching-rate confidence interval (77 ± 16 kg N ha^{-1} y^{-1} [69 ± 14 lb N ac^{-1} yr^{-1}]) to croplands (71 ± 37 kg N ha^{-1} y^{-1} [63 ± 33 lb N ac^{-1} yr^{-1}]). This is because the total drain-field area (2.6 ha [6.4 ac]) was 20-fold and 80-fold lower than the total land area under lawns and croplands, respectively. The relatively high leaching losses from lawns were due to high leaching rates of 184 ± 21 kg N ha^{-1} y^{-1} [164 ± 19 lb N ac^{-1} yr^{-1}] that

Table 3

Summary statistics for annual nitrate-nitrogen (NO_3-N) leaching from fields, lawns, and drain fields for the period from January 1, 2010, through December 31, 2011.

	NO_3-N leaching (kg N ha^{-1} y^{-1})*				
Management scenario	Minimum	Maximum	Median	Mean	sd
Grass hay	70	96	80	82	9
Grass pasture	76	106	95	93	12
Alfalfa/wheat rotation†	4	10	4	5	2
Lawn turf	122	194	191	184	21
Drain fields‡	44	123	71	76	16
Wheat monoculture	11	33	12	15	6

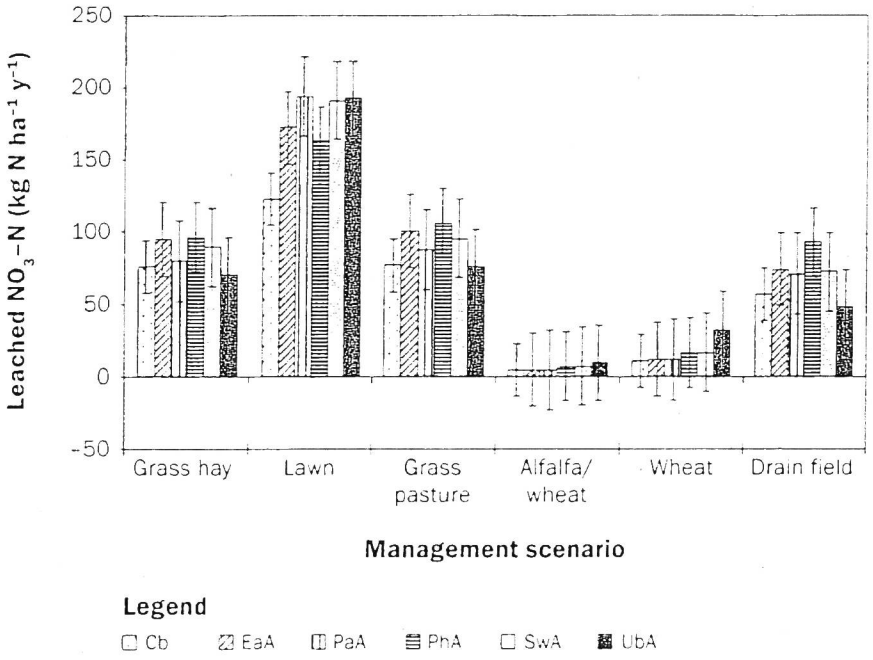
*Mean annual leaching rates for 2010 and 2011.

†Spring wheat in 2005 and alfalfa from 2006 to 2011.

‡ Drain-field statistics are for fourteen management scenarios (effluent loading rates).

Figure 2

Mean annual nitrate-nitrogen (NO_3-N) leaching rates for different soil types under different management scenarios. The error bars are plus or minus one standard error. The soil series abbreviations, Cb, EaA, PaA, PhA, SwA, and UbA, are given in table 1.



may be attributed to high fertilizer application rates (table 2). The overall contribution of lawns to NO_3-N loading of groundwater in the sector was 30% lower than the croplands in spite of the fact that the area-based estimated mean leaching rate from the lawns (180 kg ha^{-1} y^{-1} [160 lb ac^{-1} yr^{-1}]) was more than double the rate from the croplands (70 kg ha^{-1} y^{-1} [62 lb ac^{-1} yr^{-1}]). Again, the load from the 4-fold smaller lawn area was lower than that from the cropland despite the higher leaching rates from lawns. Considering that cropland is being replaced by lawns as residential areas expand into agricultural areas, this result implies that NO_3 concentrations could increase in aquifers underlying these areas.

Groundwater Nitrate-Nitrogen Concentrations. The 95% confidence interval of groundwater NO_3-N concentrations estimated from the NLEAP-simulated annual leaching losses, the background NO_3-N concentration, and groundwater flows, was 1.6 to 2.2 mg N L^{-1} (table 5). There was no statistical difference between the estimated NO_3-N concentrations and the concentrations measured from wells 4 and 8 whose 95% confidence interval was 1.2 to 9 mg N L^{-1}.

Soil Residual Nitrate-Nitrogen. The predicted overall residual NO_3-N for the lawns (12 ± 3.4, [mean ± 1 sd]) was higher than the drain fields (3.4 ± 1.1) and crop lands (2.1 ± 1.2 mg N kg^{-1} soil). The relatively high annual NO_3-N residual of 13,700 kg (30,000 lb) (table 4) was due to relatively high rates of soil NO_3-N accumulation (figure 6) that are attributable to high fertilizer application rates. A positive correlation between residual N and leaching losses has been reported in the literature (Shumway et al. 2012). This implies that future NO_3-N leaching in sector 48 would be more sustained by the residual N from the lawns than the other fields if the sector received no additional N in succeeding years.

Validation and Sensitivity Analysis. The overall, simulated 2010 and 2011 annual average residual NO_3-N for the top 150 cm (59 in) soil profile from all soils and management practices (croplands with rotation, lawns, and drain fields), excluding spring wheat monoculture, was 4 mg N kg^{-1} (4 ppm). The July of 2010 and July of 2011 NLEAP predicted soil residual NO_3-N concentrations in the surface 150 cm for crops and soils sampled for validation are compared to average measured NO_3-N concentrations in the surface 33 cm (13 in) of these combinations in table 6.

Predicted July of 2011 soil residual NO_3-N for pasture grass fell within the 95% confidence interval for the measurement in July of 2013, but the July of 2010 predicted value exceeded the upper confidence limit. The predicted July of 2010 and July of 2011 residual NO_3-N concentrations for the grass hay field were within the 95% confidence interval of the measured mean. These fields had not been fertilized for several years.

The upper 95% confidence limits of the measured mean NO_3-N from the public building and park lawns, 4.6 and 5.5 mg N kg^{-1}, respectively, were lower than the predicted soil residual values for both July of 2010 and July of 2011 while the 95% confidence limits of the measured mean residential concentration encompassed both the July of 2010 and July of 2011 predicted residuals. Records for fertilization of the public building lawn were not available. A town councilman reported fertilization of selected areas in the public park in the sum-

Figure 3
Simulated nitrate-nitrogen (NO_3-N) leaching rates from lawns in sector 48.

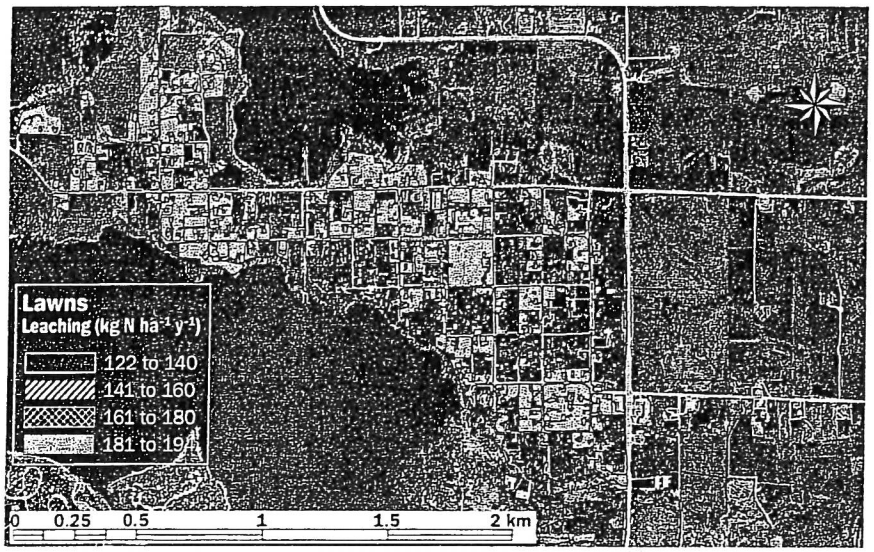
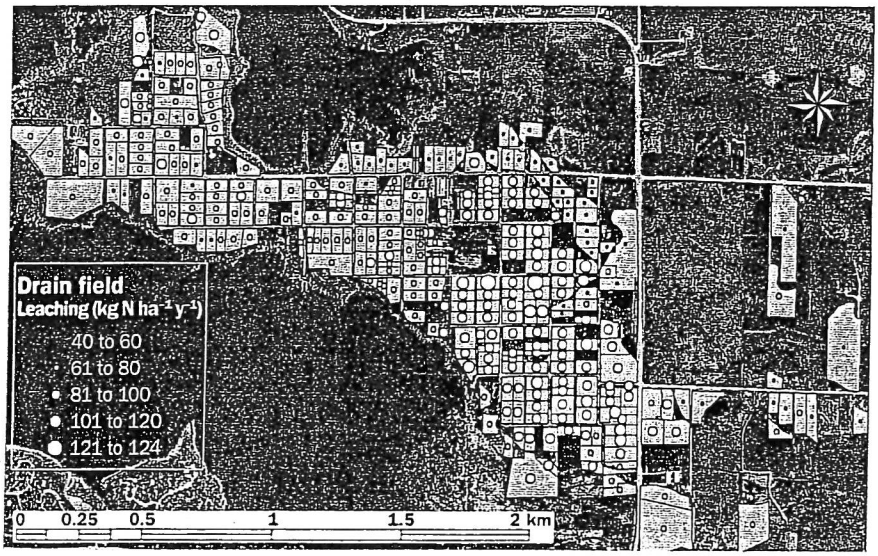


Figure 4
Simulated nitrate-nitrogen (NO_3-N) leaching rates from drain fields in sector 48.



mer of 2012 but records for the amount of N applied were not available. The residential lawn received 33.7 kg N ha^{-1} (30.1 lb N ac^{-1}) in a single fertilizer application in the summer of 2012, roughly 14% of the recommended annual rate. The form of the chemical fertilizer N applied was not known. The residence lawn had not been fertilized prior to sampling in 2013.

The measured mean NO_3-N concentration in the alfalfa field was 270-fold higher than the predicted residual concentration. The farmer growing the alfalfa commented that this field had been historically very fertile and had not received any fertilizer for several years. Similarly, the NO_3-N concentrations measured in the barley field were much higher than predicted by the model. This field and the alfalfa field are within 150 m (490 ft) of each other and within the same soil type. The barley field had produced alfalfa through 2011. The field was then plowed and, in 2012, fertilized with 6.3 kg N ha^{-1} (5.6 lb N ac^{-1}) using a solution containing urea and ammonium nitrate (NH_4NO_3) prior to planting with Sudan grass (*Sorghum bicolor* subsp. *Drummondii*). An unexpectedly high yield of grass was harvested that year. Barley was planted in 2013 without fertilization. The source of the relatively high measured NO_3-N in the alfalfa and barley fields is unknown but it may be from fertilization in the distant past or from geological sources (Holloway and Dahlgren 2002; Stadler et al. 2008).

Soil core sampling validated NLEAP simulation results in the grass hay field, and the pasture grass field had NO_3-N concentrations similar to those predicted. This outcome is reasonable because the initial soil N content and fertilization practice, i.e., little or no fertilizer has been applied over periods of several years, aligns with the assumptions made in the modeled scenario. The validation of the simulated residual NO_3-N concentration in the residence lawn soil is interesting considering that the lawn had been fertilized at a frequency and application below that assumed in the model since the current owner purchased the property several years ago. Perhaps previous land use had left the soil relatively rich in N. The model assumptions simply did not hold for the public building and park lawns where fertilizer has been applied at a rate substantially below the assumed rate. Core sampling did not validate the predicted NO_3-N concentrations in the alfalfa and barley fields. The concentrations of NO_3-N in the alfalfa and barley fields far exceeded the assumed initial condition and the source of the N is unknown.

Sensitivity analysis results (figure 7) showed that predicted NO_3 leaching from the lawns under Phoebe sandy loam soil had low sensitivity to changes in turf grass total N uptake, C:N ratio, and soil organic matter, respectively. A 50% increase in soil organic matter content resulted in a 16% increase in NO_3 leaching rate (kg N ha^{-1} y^{-1}). These sensitivity analysis results imply that the uncertainties arising from the choice of the magnitude of each of these input variables are insensitive. It is anticipated that the sensitivity of predicted NO_3 leaching to changes in these input variables would similarly be low for the other crop/soil combinations since the simulations were conducted under near steady state conditions.

Assessment of Water and Fertilizer Application Rates for Lawns. Simulation of the NO_3 pool and losses from lawns at 50%

Figure 5

Simulated nitrate-nitrogen (NO_3-N) leaching rates from croplands in sector 48. Areas A, G and P represent alfalfa/wheat rotation (year 1 wheat; next 6 years alfalfa), grass hay, and grass pasture, respectively. The fields are demarcated according to soil and crop types.

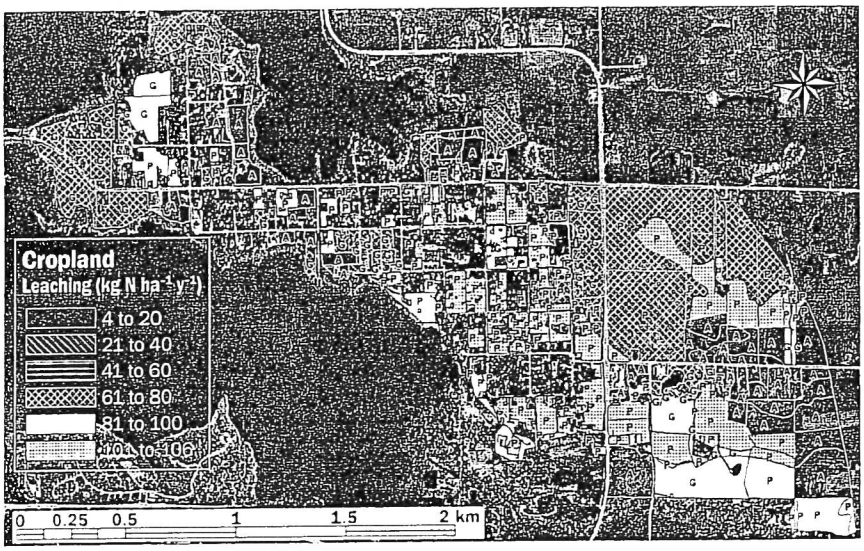


Table 4

Annual nitrate-nitrogen (NO_3-N) pools and losses simulated using Nitrogen Loss and Environmental Assessment Package-Geographic Information System 4.2 for sector 48. The total land area, for which the results were based: cropland (alfalfa/wheat rotation, grass pasture, and pasture hay) = 209 ha; lawns = 53 ha; drain-fields = 2.6 ha; and baseline scenario = 262 ha. Drain-fields were overlain by lawns.

NO_3-N residual or loss	Cropland (kg N y^{-1})	Lawns (kg N y^{-1})	Drain-fields (kg N y^{-1})	Baseline scenario (kg N y^{-1})
Leaching	14,200	10,000	200	3,800
Denitrification	2,050	1,720	30	1,850
Emissions	460	680	5	760
Runoff	40	10	0	40
Volatilization	980	3,960	5	3,270
Residual	9,170	13,700	180	3,570

Table 5

Comparisons of observed ground water nitrate-nitrogen (NO_3-N) concentrations with those estimated from Nitrogen Loss and Environmental Assessment Package-Geographic Information System 4.2 simulated leaching losses.

Description	Mean	Upper limit	Lower limit
Measured concentrations (mg N L^{-1})*	5.1	9	1.2
Estimated concentrations (mg N L^{-1})†	1.9	2.2	1.6
Ground water flow (m^3)‡	6.2×10^6	7.2×10^6	5.1×10^6

*Statistics obtained from measured N concentrations from wells 4 and 8. Seven grab samplings for April 19, 2011, through November 14, 2011, were used.

†The sum of the background NO_3-N concentration of 0.4 mg N L^{-1} and the confidence interval of estimated concentrations from ‡ and the Nitrogen Loss and Environmental Assessment Package simulated leaching loss of 9,020 kg N (19,900 lb N). The simulated leaching losses were from 802 fields (croplands, lawns, and drain-fields) for May 1, 2011, through November 14, 2011. The total area for the 802 fields was 265 ha (655 ac).

‡Ground water flows for May 1, 2011, through November 14, 2011, obtained from a nearly log-normal spatial distribution of sector 48 flows obtained from a geographic information system database file.

lower fertilizer application rate (i.e., 125 kg N ha^{-1} [110 lb N ac^{-1}]) than that recommended, lowered the NO_3-N residual, leaching, nitrogen gas emissions, nitrogen dioxide emissions, and volatilization while changes in runoff losses were negligible. The overall NO_3-N leaching (and estimate of groundwater concentration) in sector 48 declined by 15% and the overall residual soil N by 25%. The results underscore the significance of reducing the fertilizer application rates to lawns in order to lower NO_3-N leaching (and other) losses. Increases in lawn areas would offset these reductions. A 50% reduction in irrigation application rate decreased leaching rates 2-fold below the 50% fertilizer application reduction. The reduction in irrigation application rates resulted in 31% higher residual N. The residual N and leaching results suggest the need for integration of irrigation water management, fertilizer application management, and other best management practices in controlling N leaching from lawns in sector 48. A comparison of leaching rates from the current fertilizer rate and the recommended irrigation application rate with a scenario comprising the current fertilizer application rate and the rate at which average Utah homeowners water their lawns showed that the latter had 9% higher leaching rates than the former.

The study has shown the need to implement management practices to reduce the impact of lawns and croplands on groundwater quality. For example, reducing the amounts of fertilizers applied to the lawns and practicing precision fertilizer application based on crop need, residual soil NO_3-N, soil drainage properties and organic matter content (NRCS 2012b; Shumway et al. 2012). Split fertilizer applications can provide NO_3 amounts that closely match the rate of NO_3 uptake by the crop and minimize the chances of NO_3 leaching. A split fertilizer application simulation conducted in this study (data not shown) on the cropland showed a decline in leaching losses. Precision irrigation water applications to the lawns and cropland, based on crop water need and soil drainage properties, in addition to following the water applications recommended by the UDWR (2012) is likely to be effective in reducing NO_3 loading. Some soils may need the addition of organic matter to improve their water holding capacities (Stamatiadis et al. 1999).

Table 6

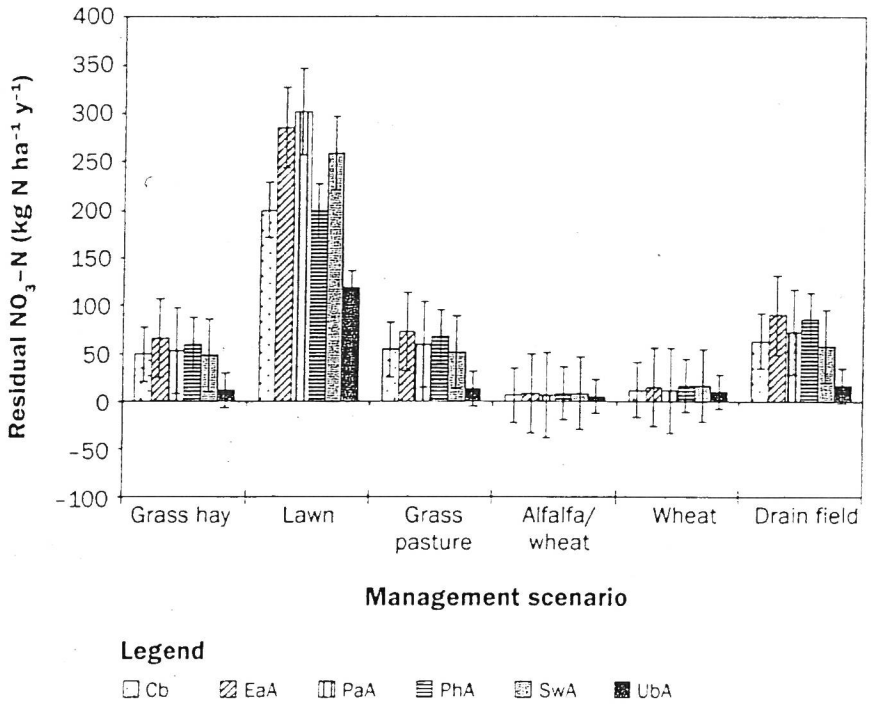
Comparison of predicted and measured (mean ± 1 sd, $n = 4$) nitrate-nitrogen (NO_3-N) concentrations in selected crop/soil combinations. Measurements to validate the predicted results were taken in July of 2013. The soil series abbrieviations, Cb, EaA, PaA, PhA, SwA, and UbA, are given in table 1.

Description	Soil	Crop	July of 2010 predicted NO_3-N (mg kg^{-1})	July of 2011 predicted NO_3-N (mg kg^{-1})	Measured NO_3-N (mg kg^{-1})
Public building grounds	PaA	Lawn grass	11.92	8.15	3.3 ± 0.8
Public park	PhA	Lawn grass	9.92	6.68	3.4 ± 1.3
Residence	Cb	Lawn grass	7.49	5.52	6.4 ± 1.0
Horse pasture	PhA	Pasture grass	5.52	3.29	2.6 ± 0.8
Grass hay	PhA	Grass	3.99	2.36	2.8 ± 0.9
Alfalfa hay*	EaA	Alfalfa	0.01	0.02	5.4 ± 1.6
Barley*	EaA	Barley	0.01	0.02	9.4 ± 2.4

*Alfalfa/barley rotation: the field was under the mentioned crop at the time of soil sampling.

Figure 6

Residual nitrate-nitrogen (NO_3-N) for different soils under different management practices. The error bars are plus or minus one standard error. The soil series abbrieviations, Cb, EaA, PaA, PhA, SwA, and UbA, are given in table 1.



Summary and Conclusion

The study has simulated proportionate contributions of irrigated croplands, lawns, and on-site wastewater treatment system drain fields to annual groundwater NO_3 loadings in the shallow, unconfined aquifer in Ogden Valley, Utah.

The simulations strongly suggested that reducing groundwater NO_3 loads to Pineview Reservoir is feasible by reducing and carefully managing fertilization and irrigation in the mixed residential and agricultural area studied. The need for nutrient pollution control programs to incorporate management practices for lawns, especially, was not foreseen. Nitrate loads from on-site wastewater systems were significant but were anticipated to represent a larger fraction of the total.

The leaching rates from drain fields were a clear indicator of the threat that sewage effluent poses to groundwater quality and N loading to the reservoir, especially in areas with high septic system densities. Decision makers may use these findings to determine whether or not construction of a central sewer system may be a viable option for controlling NO_3 loadings from wastewater disposal.

Implementing crop rotation practices on land under grass pasture and grass hay production would reduce accumulation of soil NO_3 when a crop with higher nutrient uptake capabilities is included in the rotation. This was indicated by higher leaching losses from land under grass pasture or hay than losses from continuous wheat cultivation or alfalfa/wheat rotation.

NLEAP-GIS 4.2 could be made more widely applicable by incorporating lawn management and on-site wastewater disposal scenarios to facilitate simulations of NO_3 pathways and pools to assist conservationists in controlling NO_3 losses to water resources.

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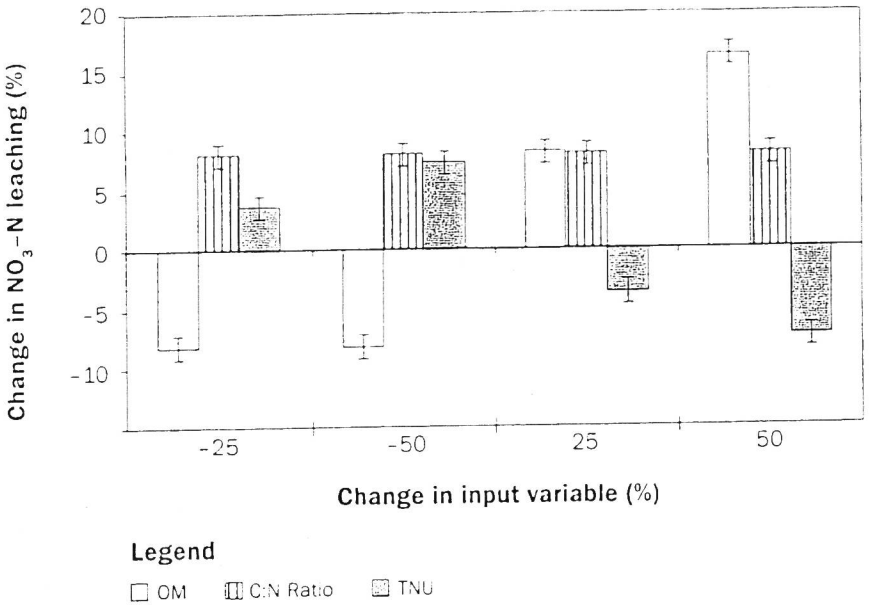
Figure 7
Sensitivity analysis for total nitrogen uptake (TNU) (mass N per harvest unit, e.g., kg N t^{-1}), carbon:nitrogen ratio, and soil organic matter (OM) for a turf grass planted on Phoebe sandy loam soil. The error bars are plus or minus one standard error.



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August 26, 2014

Ogden Valley Township Planning Commission
Cluster Subdivision Work-Session

WS1.

Discussion:

1. Review of previous work-sessions.
    a. March 4th, 2014
        i. Update on Western Weber Township Planning Commission's work on the cluster subdivision code.
        ii. Discussed TDR's role in the cluster subdivision code.
    b. June 24th, 2014
        i. Studied sketch plan approval procedures from other jurisdictions.
        ii. Reviewed current draft.

2. Review of the cluster subdivision codes bonus density criteria.
    a. Should bonuses continue?
    b. Should TDR's be included?
    c. At what rate should bonuses be awarded?
    d. Other.

Sec. 108-3-6. Bonus density.

(a) In the Forest Zones F-40, and F-10, a maximum bonus density of 20 percent may be approved and shall be based on an accumulation of the following:

(1) Developing a cluster subdivision that the planning commission determines meets the intent of this chapter; a five percent bonus may be granted.

(2) Providing road stubs to adjacent property where the planning commission determines that streets are needed to provide for current or future traffic circulation; up to a five percent bonus density may be granted.

(3) Provides access to public lands; up to a five percent bonus density may be granted.

(4) The common area is open to the public and provides amenities to the general public such as trails; up to a five percent bonus density may be granted.

(5) Protection of areas that are identified by the state division of wildlife resources as critical wildlife habit; up to a ten percent bonus density may be granted.

(b) In the Agricultural Valley Zone AV-3, Forest Zone F-5 and the Forest Valley Zone FV-3: a maximum bonus density of 30 percent may be approved and shall be based on an accumulation of the following:

(1) Developing a cluster subdivision that the planning commission determines meets the intent of this chapter; a ten percent bonus may be granted.

(2) For each five percent of open space preserved in the subdivision in excess of the minimum required by this chapter; up to a five percent bonus density may be granted.

(3) Providing road stubs to adjacent property where the planning commission determines that streets are needed to provide for current or future traffic circulation; a five percent bonus density may be granted per stub up to a maximum of ten percent.

(4) Provides access to public lands; up to a five percent bonus density may be granted.

(5) The common area is open to the public and provides amenities to the general public such as trail; up to a ten percent bonus density may be granted.

(6) Ten percent of the lots and homes are permanently set aside for affordable housing (as outlined by the Affordable Housing Act of 1990); up to a ten percent bonus density may be granted.

(7) Preservation of an agricultural parcel with an agricultural preservation plan approved by the planning commission and a agricultural preservation easement recorded on the parcel:

a. Between ten and 20 acres; up to a ten percent bonus density may be granted.

b. 20 acres or larger; up to a 15 percent bonus density may be granted.

(8) Preservation of historical sites and buildings (barns, homes, trails, or other structures); up to a five percent bonus density may be granted.

(9) Development of excess sewage treatment capacity; up to a five percent bonus density may be granted.

(10) Preservation in open space of areas that are identified by the state division of wildlife resources as providing valuable wildlife habit; up to a ten percent bonus density may be granted.

(11) Preservation in open space of areas that are identified by the state division of wildlife resources as critical wildlife habit; up to a 15 percent bonus density may be granted.

(12) Open space is contiguous to permanently preserved open space on an adjoining property; up to a five percent bonus density may be granted.

(13) Preserving in open space a 300-foot setback from the high water mark of Pineview Reservoir; up to ten percent bonus density may be granted.